The Builder.

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Architectural Memorial.

PEN to serious question is the truth of the line "The world knows nothing of its greatest men." The assertion is, to say the least of it, by its very nature incapable of proof. Its probability is small. Its morality is questionable; inasmuch as its tendency is to lead to the encouragement of self-satisfied brooding rather than to that of vigorous effort. The point, however, of most interest to many of us is rather what are the indications of greatness given by our contemporaries or our immediate predecessors, and what is the most imposing, durable, and suitable form of memorial which should be reared to those who have earned the title of great or of good.

Pre-eminently must this latter question be regarded as one to be settled by the builder. Of all memorials the most famous and most durable are those of architecture. Such was felt to be the case six thousand years ago. To that conviction we owe the existence of the Pyramids, the obelisks, the temples, and the written stones of Egypt. To the same feeling we owe most of the architectural wealth of our own country. For purely military building, the conviction of strategic importance may possibly have furnished ample motives for their erection. We may admit that Julius Cæsar, or the early founders and fortifiers of the Tower of London, had only in view the military exigencies of their position, and cared not to hand down their name to posterity as founders and builders. Such may, we say, have been the case; but there is no proof that it was so. But outside this narrow structural circle it is impossible to doubt that the idea of permanent remembrance underlies the activity of the great builders of past times. The very name of a tomb, *mnemeion*, implies this truth. "Sacred to the memory" is an inscription read in Oscan as well as in Anglo-Saxon,—in hieroglyphics as well as in Roman letters. The tomb-stone is the very rudest, simplest, and poorest expression of this universal desire. The association of a tomb with a place of worship, abhorrent as it is to the institutions of the Law of Moses, is yet found to prevail throughout Palestine. The numerous "makams," or small houses which are at once monuments of saints and places for prayer, which stud the Holy Land, are relics of a worship older than the law of Moses. Joshua was an intruder on the territory of a more ancient faith, which has still maintained its hold on the memories of the people. Its structural monuments have outlasted (at least in their local sanctity and fame) the flux and reflux of the waves of conquest. Jew, Christian, and Mussulman have successively won and ruled the Holy Land, without rooting out the simple buildings that commemorate to this day names that were revered long before the date of the Exodus.

It is the same throughout Christendom. The dedication of Christian cathedrals and churches to the name, or, as it is called, under the invocation, of a patron saint, is universally prevalent. Legend has not unfrequently perverted the message of history. The patron saint of England, St. George, is a personage of more than doubtful identity or sanctity. St. Martha now gives her name to a church, perched high on a commanding hill in Surrey, the Latin name of which commemorated the noble army of martyrs. But, rightly or wrongly, truly or falsely, the names of the great and the good in past times are best held in perpetual remembrance by the work of the builder, annexing their names to some devotional edifice.

When we come down from times that are earlier than the yet deciphered records of history, as in the case of the makams of Syria, through the darkness of Mediæval ignorance, when monkish memorials took root, to the great building centuries of Christian architects, we find a permanence, a lustre, and a truth, which it is hard to rival, attaching to our great Gothic buildings. Especially are they of interest, alike to the historian and to the architect, when they tell their own story. Such is the case with the cathedral of Christchurch at Oxford. Small as it is for a cathedral, it yet has a peculiar beauty. It is the memorial of a great churchman, with whose fame we are most familiar from the magic pages of Shakspeare. But whatever Wolsey may have been as a man, Christchurch tells, in tones not to be mistaken, what he was as a churchman, a statesman, and a founder. In the chancel of that cathedral the squat, round, substantial columns are surmounted by round arches. Over them, the triforium-range shows a round-headed arcade, or twin pairs of round arches. All is strong, simple, consistent, elegant in its unity of purpose, and redolent of the Norman builders. But from the graceful arcade springs, at one bound, the fretted and pendent roof-work of the time of Henry VIII. The building thus forms a truthful record. Over the unroofed chapel of the dispossessed monks the great cardinal spread the ægis of his protection. The monastery fell; the college rose, and stood,—and stands

> "Yet so famous,
> So excellent in art, and still so rising,
> That Christendom shall ever speak his virtue."

The prayers for the soul of the great founder of Christchurch are now replaced by the simple mention of his name in the bidding prayer. But while forms of words may alter, the durable record of the architect remains. We read in the compound architecture of Christchurch a more truthful chapter of English history than is to be found in the pages of Macaulay. We trace there the evidence that when, in the fulness of time, monasticism fell, because its work was done, a man had in his hand the helm of State who prevented the church from falling with the monastery. The grasp and foresight of Wolsey were those of the true statesman. From the fall of the ripe and rotten abuses of his day he rescued just so much as was capable of rescue. He aided the royal power to destroy, and even to rob, the regular clergy. But in so doing he provided a cradle and a school for the secular clergy, which is still one of the foremost in Europe.

In ages when all education was in the hands of the clergy, it was natural that theology should be held to be the master-science, and that ecclesiastical buildings should be regarded as at the same time those of which the erection was most acceptable to God, and most famous and meritorious for men. And of such structures, it must be remembered, the fame was not single; while the founder was commemorated, the builder was not forgotten. Some great churchmen combined the two functions. Plans were drawn by, or under the direction of, great abbots and bishops, whose ideas, wrought out in stone, yet live in our churches and cathedrals. At other times the name of the architect, sculptor, or brassfounder ranks side by side with that of the founder in a pecuniary sense. The spirit was everywhere the same. The Freemasons, of whom a duke's son was proud to be the spokesman at Chesterfield, ranged through Europe, and brought to the elevation of each new church, convent, or abbey, a knowledge that was in harmony with the utmost advance made in architecture in any part of the world. Thus while each country has its national style of architecture, and while each geological district has its special style, fixed on it to some extent by the nature of the accessible materials for buildings; and while, yet again, each architect had his own special style and favourite mode of treatment; there is a chronological harmony that runs throughout; and this harmony must, in great part, be due to the institution of the Freemasons.

With the fall of the Church of Rome in England one great class of motives for the foundation of noble memorial buildings fell also. Down to the time of the Reformation, the duty of praying for the soul of the founder was attached to the enjoyment of the fruits of his munificence. Even in the case of a bridge, or of a ferry, a small way-side chapel often recalled to the passenger the existence of this claim on his gratitude. It is instructive to trace the reflection, from the walls of our churches, of the change in theological dogma. In the reredos of the Chapel of University College, Oxford, fifty two canopied niches stand empty. Their once worshipped occupants were rudely hurled from their pedestals by the rough soldiers of Cromwell. The Christ of the Priory Church of Christ

Church, in Hampshire, is one of a very few images which escaped the fury of Presbyterian and Independent; and that escape may be held to be mainly due to the great height of the niche above the ground. With the saints went the prayers. But with the prayers went, there is no doubt, one main motive for structural memorial. It was not solely from charity to unborn generations that church or abbey was reared. It was not simply for the acquisition of a posthumous fame that windows were enriched with tracery, and filled with the wealth of colour of stained glass. These motives existed, no doubt. But with them co-existed a more powerful incentive to build, to found, and to endow. The belief that the founder would, in the shadowy land to which he was about to depart, reap the benefit of priestly prayers, and that his purgatorial fires should be rendered tolerable by the sweet music of chanted psalms, was no doubt far more effective in the mind of every benefactor of the church. And, in point of fact, with the disturbance of this productive belief, churches ceased to be built. From the time of Charles I. to the present century the number of churches built in England could be reckoned on the fingers. The very traditions and habit of building were so lost, that it was necessary to appeal to Parliament for power to build a new church.

Of the noble and stirring activity which has replaced that great slumber of the church-builder we have not now to speak. It is to a memorial of another description that our attention has been called by the meeting at Chesterfield. The claims of the poor, the ignorant, and the unborn on private munificence are not less than was the case in the time of King Henry VIII. On the contrary, they are more imperative, in the proportion of the great increase in the population of our island in the last three hundred years. The wealth which can display itself in munificence is, again, even more largely increased. And recent instances of the devotion of wealth, honestly obtained, to national purposes, have been so numerous that we have some reason to look forward to another era of founding,—not of founding of churches alone, but of colleges, halls, museums, professorships, scholarships, and the various aids of sound and useful learning.

In work of this kind the erection of a public building as the memorial of a great man occupies a conspicuous part. It cannot be denied that there is something extremely apt in the erection of the Stephenson memorial at Chesterfield. So was that of the Wedgwood memorial at Burslem. But the question deserves mature consideration, how far should efforts of this kind be encouraged as purely local, or how far should they be rendered tenfold in their efficacy by combination into some general scheme. A mechanics' institute in each great town is a worthy and desirable object. But what would be the effect on the technical education and productive power of the nation of combining half the amount of effort, that is comparatively frittered away by distribution, in the founding of an industrial university?

The great feature of the century is the extraordinary advance of man in the knowledge and command of the powers of nature. While we must never forget that the name of Watt heads the illustrious roll of the pioneers of this advance, all honour is due to George Stephenson as one of the most famous of the leaders. Few who knew the two Stephensons but would have acknowledged the superiority of the son to the father. But, then, Robert Stephenson had an education; if not an education equal to that of his friend and rival, Brunel. The education of his father was home-made,—self-made,—that kind of education which it is only anxious energy and perseverance that enable a man to procure. It is well, for the sake of the young, that examples such as those of George Stephenson should be continually held in public honour. It is not very long since we reviewed the life of another man of the same grit and pith, a friend and associate of Stephenson, William Fairbairn. We hope it may be long before we are called on to render the same service to a third of the same group of national benefactors, Joseph Whitworth. But that name reminds us that there is such a thing as a cumulative claim to public honour. If the man who makes two blades of grass grow where one grew before is a national benefactor, what is he who has increased the rapidity of internal and external communication in a four-fold, or even a ten-fold, ratio? Or, rather, what are they who have taken separate and important parts in effecting that great revolution? Work of this kind is deservedly twice paid. It is paid in the material wealth with which, in the long run, it usually endows its performers. It is paid in the honour rendered to their names. But where a part of this wealth is devoted to giving a helping hand to those who have yet to place the foot on the first rung of the ladder by which such men as Stephenson, Fairbairn, and Whitworth climbed to wealth and to fame, the claim of the donor to honourable memory is more than doubled. To the intellectual triumph, which is the blue ribbon of the nineteenth century, such men add the moral worth which formed the jewel of the centuries before the Reformation. Few ancient foundations, whether chapel, convent, or monastery, had higher claims to veneration than have the noble hospitals which are now supported by private donations. With all but the very grandest of mediæval foundations the Peabody donation, at any rate in intention, may not unworthily compare. Men who leave their wealth for national purposes, who found professorships, or endow exhibitions, or scholarships, by their wills, are still honoured and remembered, although not publicly prayed for. But if their claims to public gratitude be duly admitted, and if, moreover, their wealth be not directed into a channel in which it will only flow after the death of the acquirer or owner, but be to some extent applied and distributed during his lifetime and under his own eyes, we may yet be proud to say that we find names of Englishmen of the present time worthy to be recorded with those of Waynflete, Chicheley, and Wolsey.

We shall rejoice if any remark of ours, either in the present paper or on former occasions, may lead to the careful consideration of the subject of the foundation of a scientific and industrial university. The wealth is not wanting. The charitable purpose has been often evinced of late. The desire for posthumous honour is not,—we would hope,—quenched with the silence of the voices that formerly chanted prayers for the soul of the benefactor. And there is one consideration which has not, so far as we are aware, yet been brought forward, which ought to have extraordinary weight.

It is, perhaps, difficult to measure the value of such centres of education as Oxford or Cambridge. During dark ages the lamp of learning was kept alive in the monasteries and universities. How much do we not owe to the Benedictines? But the main idea of all the theological universities was, not progress, but permanence. A new revelation was held to be impossible,—a matter for which it would be impiety to wish. At the same time it was held that the most perfect patterns and examples of human life were to be looked for in history. They were not to be found among the men of the time. Still less could the student be encouraged to hope to excel those who had gone before him. To conceive that he could do more than humbly tread in their venerated footsteps would be to encourage the mortal sin of pride. Permanence, rest, stability, were the chief aims of the great monkish universities. Their study was of the past. It was a fossil study. But it was not undertaken with the view of learning any law of development. And thus, even at the present moment, and in our most famous seats of learning, the fossil element is so powerful that many a hooded doctor or master may be thought to be almost semi-fossilised himself.

In the industrial universities, whenever the good time comes for their establishment, this leading feature will be reversed. The vanishing point of the perspective will be in the future, not in the past. A full and accurate knowledge of the conquests of human science during the present century must inspire the profoundest conviction of the immense area of the science of the future. The more instructed a man now is in any natural science, the more fully is he aware that we have hardly mastered the alphabet of scientific knowledge. As to its grammar, we have acquired but a very few rules. Such being the case, the effect of bringing together a body of scientific men who should be relieved from the necessity of any toil but that of the teacher and the explorer, would probably be something altogether without precedent. We are not anticipating a millennium, or imagining that the envies, and jealousies, and enmities of the scientific world would be at once destroyed by grouping together a certain number of gifted men as a faculty, and freeing them from the ignoble spur of a pecuniary reason for keeping their names before the public. But the experience of our ancient seats of learning shows that a strong influence in this direction would be exerted by the sole fact of juxtaposition. When the geologist had to meet, in the discharge of common functions, the physical philosopher, it would soon become impossible for him to disregard the sound reasons adduced by the latter for the limitation of that immeasurable past on which the former is now wont so freely to draw. It is rather with the view that science should check, limit, and inform science (using the term to denote a special branch of knowledge), than that professor should check and enlighten professor, that the first effect of the concentration of study might be expected to become evident. But the first action would induce the second. While every aid that one discovery could give to the pursuit of another, such as that which the chemist could give to the metallurgist, or the mathematician to the mechanic, would be constantly and readily available, the interchange between chemist, mechanic, physicist, geologist, botanist, zoologist, and other specialists, of the common language of science would articulate those various pursuits into a magnificent philosophical unity. We should be daily gaining at least scraps of that philosopher's stone which was the dream of the alchemists; and which is not likely to cease to be a dream until the common aims of the chiefs of the army of science are indicated by some more intimate association than is now possible between them.

We hope that the feeling stirred up by the appropriate ceremonial at Chesterfield will not be allowed to subside. We desire to call the attention of some of the leaders of thought and action amongst ourselves to the importance of making the best of our means and opportunities. To intending donors the subject is one of no small interest. A great collection, for example, of engravings and other information illustrating a special subject, such as the history of an art, the structural and architectural growth of the metropolis, or that of any ancient and important centre of industrial life, is one of those matters for which the donor may at present seek in vain a suitable spot to preserve his own memory, and to give the utmost utility to the treasures he has collected. The value of mutual illustration it is impossible to determine and hard to overrate. That it is very great there is no doubt. How many resources would become available were a common centre thus formed we cannot say. But there is evidence that they would be ample. The subject is not altogether new. Manchester is now stirring about it. But it would be more in accordance with what experience has shown to be advantageous to establish, after mature deliberation, a new centre for the higher industrial education, than it would be to graft it on the busy life of a great city. The results of the establishment of colleges in London, where, if anywhere, there seemed to be need for them, have hardly been such as to reverse the old opinion, that the metropolis of letters or of arts should not be that of commerce, of manufactures, or of political government. Some Cumberland, Westmoreland, Welsh, or Scottish valley, where pure streams might water the college glades, and water-power might be obtained at will to give to the student the same lesson which the Cumberland forces gave to Sir W. Armstrong when a boy, would seem to us to be the proper scene for an industrial university. But that is a question which it is premature now to discuss. What we wish to urge on our reader is the consideration of the mode in which architectural memorials, and those endowments which are associated with them, may be so directed in the future as to prove of most service to the country.

Stockton Surveyorship.—A special meeting of the Stockton Town Council has been held for the purpose of electing a surveyor for the borough, *vice* Mr. George Edwards, resigned. There were ninety-one applications for the office, and the sub-committee appointed to consider them reduced this number to four, the names being James Hall, surveyor to the South Stockton Local Board; John H. Hanson, assistant borough surveyor at Huddersfield; R. Telford, assistant to the borough surveyor, Newcastle; and L. Lloyd, surveyor to the Bilston Local Board. The voting, which was by ballot, showed twenty members in favour of Hall, and seven in favour of Hanson, and the former was declared duly elected. Mr. Hall has been surveyor of South Stockton about four years. The salary attached to the office to which he has just been elected is 300*l.* per annum. Mr. Edwards has been retained as consulting engineer at a salary of 100*l.* per year.

SOME CHANGES AND ADDITIONS AT SOUTH KENSINGTON.

The practice of every now and then shifting and re-arranging the objects in the South Kensington Museum, which has been found fault with, not unreasonably, as increasing the confusion and the difficulty of finding what one wants in that rather bewildering collection, has its effect in bringing into a new light things which have been overlooked and insufficiently exhibited previously. This is, we believe, the defence made by the authorities of their practice of moving things about so often; and though this is really a confession of weakness in regard either to the building or its management (as everything ought to be permanently arranged so as to be well seen), it must be confessed that the system gives occasion to agreeable surprises at times. For example, on entering the North Court, the *habitué* is at first surprised at seeing, on the west side, an apparently new and rather extensive collection of Della Robbia ware. In fact, all the items here have been some time in the Museum, but have been in the background and dissociated from one another. They have now been cleaned and brightened up, and the whole of the Della Robbia collection is now to be seen at a glance arranged against the wall and on screens along the west side of the court. The brightness and freshness with which this work comes out after being washed, suggesting the idea of work just completed instead of being, as it really is, nearly four hundred years old, is a hint as to the peculiar suitability of such a mode of decoration for external architecture in towns much oppressed with smoke and soot. The present arrangement of the Della Robbia ware certainly conveys a new idea as to the extent to which this art is represented in the Museum, and the fine character of some of the specimens. In particular there comes out with much brillancy the great circular medallion with three heads in high relief, hung against the wall in one of the compartments. These are obviously portrait heads, from their characteristic expression and style; the upper one that of a female, is of rather faded and placid expression, throwing out the more by contrast the forcible character of the two heads below it, of men whose handsome regular features, and intense and by no means amiable expression, seem like an epitome of the Italian life of the age which produced them, with its ominous union of esthetic refinement and moral cruelty. The portion of an archivolt in another compartment, decorated with cherubs' heads with unglazed faces on the glazed ground, and coloured wings and yellow *nimbi*, is a charming piece of architectural decorative work, the little heads modelled with real and living artistic feeling, no mechanical work of an ornamental carver. Whether the material was altogether a safe one for the architectural ornamentist, whether the facility it affords for realistic treatment is not a rather dangerous temptation, may be questioned. The knots and festoons of fruit and flowers, freely modelled and brilliantly coloured in direct imitation of nature, would no doubt have a brilliant and festive effect on the face of a building in bright weather; but the effect would perhaps be rather too much like the perpetuation in a permanent form of decorations only suitable for high-days and holidays, and inconsistent with the every-day feeling of life. Of course there is the ever-vexed question of real or conventional adaptation of nature, too, which the contemplation of these productions raises anew in the critical mind: a question which is every now and then brought up again, after one is disposed to think it is quite settled, by the allurements of such brilliant and successful imitative work as this. It is almost impossible to be coldly critical while looking at such charming productions; but if one can be so, it must perhaps be admitted that this style of art belongs rather to what may be termed the playthings than the serious occupations of art. The uncertainty in which Della Robbia and his followers seem to have been as to the good or bad effect of glazing in the case of representations of the human countenance is curious: in some of the finest examples the head is covered with a brilliant white glaze, in others the features and hands are unglazed and are left a neutral earthy tint, while the garments shine in the most brilliant colour and glazing. The effect of the modelling of the countenance is undoubtedly better in the unglazed work, considering the head apart from the rest, but the dull tones of the surface are too much thrown into the background, rather than thrown out, by the glaze of the accompaniments. The effect of the glazed faces is rather too artificial, and interfered with by catching lights, but on the whole a more homogeneous and satisfactory effect is produced by glazing the whole, and if the art were ever revived for architectural ornament with us, it must be remembered how very important is the advantage of a completely glazed and washable surface in a town atmosphere. In this respect it is really desirable that some more thought should be turned to the employment of such a medium for high-class architectural ornament in London buildings. We have glazed bricks, indeed, though no one seems to like (or, perhaps, to be able to afford) to use them much; but we have no glazed ornament available for buildings, except of the merely mechanical class of work represented by moulded bricks for ornamental strings; terra cotta is almost always used unglazed, and though not holding smoke and dirt so much as stone does, it seems to afford no safeguard against a building growing dingy. As a matter of mere good taste and architectural effect, we should by no means recommend or prefer glazed surfaces on their own account, in the country, or in ordinary towns; but London smoke demands special provision against its effects. The amount of carved ornament, in buildings in the City especially, which is simply thrown away and lost from blackening and disintegration two or three years after its execution, it is almost melancholy to contemplate; though a good deal of it certainly is not very much worth preserving. It ought to be recognised that it is not worth while to put up any decoration on a London exterior, which has not been contrived so as to resist the action of smoke; and perhaps the architect who kept this before him would be incited to a more decided endeavour to have decoration which it would be worth while to preserve,—which might be a delight and interest to future generations, as these works of the Della-Robbia school are to us now.

Not far from this collection of the Della Robbia work, another re-arrangement has brought into prominent notice some specimens of Italo-Greek antiquities, some of which are of comparatively recent acquisition, to be found in three cases standing near the south wall of the same court. In one of these we find arranged round a circular drum the figures from a very spirited alto-relief from a tomb in Canosa, representing a hunting scene; figures of men on galloping horses, on a small scale, and a good deal knocked about, but in sufficient preservation to show the spirited action of the whole, effective in spite of clumsy and naïve modelling. What is particularly interesting in this case, also, is, that we here find two vases with high handles, which handles are decorated on the sides next the vessel with small draped female figures, about 6 in. or 8 in. high, which have formerly been brilliantly coloured (a great deal of bright pink tint is still left on them, and indications of other colouring), and which are exactly similar in style and execution to those numerous little statuettes from Tanagra, in the Greek vase-room of the British Museum, the object of which has been much discussed. It has been surmised that these Tanagra figures were intended as dolls; but the two vases in this case at Kensington seem to give the real interpretation; the statuettes of this kind were ornaments which have been applied to different objects from which they have become separated, or perhaps have never been fixed in their intended place. Most of the British Museum specimens, which stand free, appear at the back as if intended for fixing against some other surface; and it is possible that, in this collection from Tanagra, consisting of so many figures so much alike, we have the remains of a kind of art-manufactory where statuette ornaments of this description were turned out ready for application where they might be desired. In this evident fashion of using the figure of the lady of the period as a decoration, we find a sort of counterpart of the fashion now prevalent of using in a decorative manner not the lady of the period, certainly, but a particular type of female figure which is repeated and repeated, so that it becomes as much a mannerism of the day as these little coloured statuettes evidently were in their day. In the vases we are mentioning at South Kensington, the body of the vessel is formed by a female head, much larger than, but otherwise exactly similar in style to the head of the little figure on the handle, and with the hair, &c., coloured in the same way. The case next to this contains Italo-Greek pottery of curious and, in some instances, very fine design, especially in the case of the large round vase which crowns the collection, with a short funnel-like spout standing up at one side of the circumference, in front of which is a head surrounded by coloured decoration; and on each side of the vase a little winged figure is modelled in high relief. We might go far before finding an antique vase more curious and characteristic than this fine specimen of earthenware art. The third case contains ancient Cyprian ware purchased last year from the Cesnola Collection, and remarkable as showing the amount of ornamental effect which may be obtained from the mere use of lines and circles, the latter used both vertically and horizontally on the bodies of the vases.

Near the same neighbourhood still, two cases of Italian work, clay and terra-cotta statuettes, of comparatively recent acquisition, and which formerly stood in a half-light in the corridor at the back, have been brought out into daylight in the centre of the court. There is a good deal of interesting work in these, but what is to be particularly noted in one of them is the rough clay model of a "River God" in the centre of the case, described on the card as "School of Michel-angelo," but which we cannot but think may be attributed with the highest probability to the master himself. This was bought only last year, and is one of the most interesting and remarkable specimens of Italian sculptural art in the building. It is a small roughly-sketched seated figure, with one hand on the conventional river-god's urn, from which the water pours; the head turned towards the left shoulder, the features only just indicated, with a long beard, of a half-seaweed character, hanging lankly from the chin. There is a power of abstract thought and expression in this figure which only genius of a high order can give. On the card, on which, as in every other case, the price paid for the specimen is named (so that every visitor may know how and for what the public money is spent here), we read "Bought, 131*l.*" It is certainly a remarkably telling instance of the value of that art into which a great thought goes, that this rough small model or sketch, in a material absolutely valueless in itself, should be now well worth that sum, or even a larger amount, to secure it for the National Art Museum.

Before leaving the north court for the present, we may draw attention to the fact that the beautiful and refined bas-reliefs of Donatello in possession of the Museum are now arranged collectively on one stand, and a remarkable collection they make. There is no treatment of marble in sculpture more refined and intellectual in its character than this, in which the surface of the marble seems lightly engraved upon rather than carved, as if the sculptor wished to see with how little disturbance or removal of the surface he could express his idea, in a form which, in its necessarily extensive use of perspective, may be said to be half way between painting and sculpture, between delineation and modelling, and to partake of the character of both arts. But we have not time now to dwell upon this. To give a word to an art of the most utterly opposite kind, we may draw a little more attention to the splendid specimens of Chinese and Japanese art which are to be found in some of the cases in the south-east corner (more especially) of the centre court. Some of these are loans, and have not been here very long, if we remember rightly. The case of objects lent by Admiral Keppel contains some of the most characteristic specimens of what constitutes the real power of Japanese art that we have seen. This power consists, as it appears to us, not merely in that singularly original exercise of the fancy which is shown in their application of the forms of animal life to ornament, — in the lobsters and frogs and monkeys which in such piquant and half-grotesque forms do duty as paper-weights, and in other forms for practical use,—but in the instinctive way in which these clever, quick minds and cunning hands seize upon the salient point in the character of the object or animal they treat, and intensify it to the utmost. Look, for instance, at the carving in wood of an elephant in Admiral Keppel's contribution. It is not actually like an elephant, in a realistic sense; it is too broad and thick, the legs too short, the feet too large. But the artist has seized upon and intensified all the points which give to the elephant its peculiar character,—the massiveness of the frame, the great head and ears, the skin in great wrinkles hanging about the framework; and in doing this he produces, in a miniature form, the impression of the size

and weight and character of the animal, in a way which a merely realistic treatment, on this small scale, could not possibly effect. A fine illustration of the same thing is found in a very little ivory carving which lies in a corner of the case, a mere toy for the button-hole, representing an eagle with his claws fixed in some small animal which he is about to make his prey. The eagle is out of proportion, the head is too large and too massive; but it is just this exaggeration of the head, the beak, the red tongue, the ample talons, which at once gives a largeness of scale and effect to this tiny little carving, which, if the bird were treated in its actual proportions, would look fragile and ineffective. It is this kind of happy exaggeration which in almost all art is at the bottom of the quality called "character," though, of course, in works on a larger scale and with a more serious meaning it must be used in a much less pronounced and more considerate manner. The talent of the Japanese in miniature ivory carving, and their precise perception of the most effective treatment of ivory, is admirably exhibited in the numerous little productions of this class to be found in this interesting collection lent by Admiral Keppel. On the other hand, their utter want of perception as to the broader aspects of nature, and the treatment of these in art, is shown in painful and grotesque contrast in a piece of carving next to the elephant aforesaid, an extraordinary specimen of wood cut and dug into pits and scrolls, and smeared with red paint, labelled "Dragon among clouds." It would be impossible to imagine a specimen of worse and more barbarous taste than this, and the fact that such a thing is found in the very same case as the other objects we have been referring to, ought to be suggestive to those who are given to so foolishingly worshipping Japanese art as a thing superior and admirable in every way, merely because it displays such originality and excellence in one special direction. The study of some of these Japanese objects, and of the prices paid for them, is instructive too in regard to the relative value, ultimately, of finish in mere workmanship, as compared with that which embodies thought conveyed through the highest forms of nature. In an adjoining case, near to the works last mentioned, for instance, is a very fine Japanese lacquered bowl, representing in its interior surface two fish most beautifully finished in lacquer-work on gold ground, the folds of the gills admirably and truly modelled, the scales most minutely represented; about as perfect a piece of realistic art as could be desired, and showing the very highest finish. This was secured for 20*l.*; and though the price is not extravagant as the market goes, it can hardly be said to be worth more. Compare this with the 131*l.* given for the rough clay model just now mentioned, and which every one who can appreciate it must feel to be below, rather than above, its value, and it will be admitted that this is a striking example of the comparative worthlessness of mere execution alongside of truly intellectual art. There is a point of resemblance, on the other hand, between the objects of Chinese and Japanese art in the Museum, and those specimens of ancient Italo-Greek art which we noticed above, viz., that both show numerous examples of that kind of use of animal forms for utensils, such as vases and jugs, with a lid or a spout in the back for use, which has been stigmatised as the peculiar offspring of modern bad taste, but which appears in fact to be as old as any art that we have any record of; an argument that, after all, we are in some points no worse, if no better, than our forefathers.

In the Architectural Court we notice that the cast of the oak choir-stalls from Ulm Cathedral has received a coating of oak paint, preparatory we suppose to a realistic graining: of course quite legitimate, as the object is professedly imitation. A few new specimens of work have been added lately, the most recent being the stone fire-places, with oak panelling over, from a house in Lime-street, London (*circa* 1620), a very good specimen of refined and tasteful work of the period; and a reproduction of the brazen font in St. Bartholomew's, Liege, a work by Lambert Patras, of the date of 1112, sculptured round the sides with the subject of the Baptism of Christ in high relief, and supported upon the backs of twelve rather grotesquely modelled oxen, whose heads and bodies project all round the base. The effect of brass work is very well given in the reproduction, and the piece is singularly curious and interesting (rather than beautiful) as a specimen of the German art of the period to which it belongs.

BERLIN AND ITS BUILDINGS.*

The Berlin Society of Architects has deserved well of its co-citizens in laying before them the mass of information, carefully compiled under its direction by some of its members, in the work before us. We have endeavoured to glean from its pages some interesting particulars respecting the German capital, for the perusal of our readers, and warmly refer our readers to the work itself. We may say at starting that the book contains more information on its particular subject than has in similar works been laid before the reader; and even those who are not masters of the language in which it is written will find sufficient return in the illustrations with which it abounds.

A few words as to the origin of the work. Its publication was prompted by the first general meeting of the Association of Societies of German Architects and Engineers. Upon the Berlin Society of Architects devolved the duty of submitting to the meeting a report on the development of Berlin, and the principal buildings of the city. The society resolved upon the publication of a pamphlet, and appointed a commission for that purpose. That commission soon came to the conclusion that, considering the abundance of matter and the importance of the subject, it would be a mistake not to make use of the occasion for solving the task set before it in a more liberal sense. Instead of issuing merely an ephemeral production for the occasion, it was found that, by making use of the numerous able pens at the disposal of the society, and by slightly increasing the labour apportioned to each, a work of permanent value might be created, which would find readers in a much wider circle.

A programme issued to this effect met with the approval of the society, and the work was proceeded with in December, 1873. The Government and the municipality willingly permitted the inspection and use of the materials under their care, the various societies and also private persons interested also meeting the architects' committee in an obliging manner. But it was soon apparent, as the work proceeded, that the scope as well as the difficulty of the task had been underrated. The time first fixed upon for its completion was far too short. The society, however, rather than abandon its object, was willing to renounce a momentary success; and, instead of presenting the completed work, was content to submit to the meeting, in 1874, the first sheets of the work, as an earnest of what was to come, and to continue and conclude the work according to the programme originally laid down.

It need not here be gone into what obstacles had to be overcome. Those acquainted with similar work can well appreciate it. It took two years longer before the committee,—whose services, it should not be forgotten to add, were entirely voluntary,—had completed their labours, but they were at last able to submit their great work.

It will be necessary, in order to rightly judge the labour undergone, to point out first the plan followed, and then to consider *seriatim* the different subjects treated. In the first place, it was incumbent, in order to give such a complete view of the great subject under consideration as it was intended should be conveyed, to treat each as fully as possible. Although, of course, only the most valuable is selected, there is no style of architecture and no class of building left unmentioned. It is self-evident that the abundance of material required a systematic arrangement, and this, as will be shown, has been strictly carried out, and has been attended by a care and scrupulous exactness which deserves the highest praise. Here it may be remarked that it had been at first intended to add a view of the organisation of the different authorities connected with the architecture of Berlin, but the book had already assumed such a size that they were left unnoticed, especially as that organisation is on the eve of a complete revolution.

After these few preliminary remarks, which are due to the work, we may proceed to discuss it in detail. In this we cannot do better than follow the systematic arrangement of the matter in the book. It consists of two parts, divided into five sections. The first section gives, in the first place, a general description of Berlin; the next treats of its historical development.

(I.) The importance of the geographical position of Berlin, in the midst of the sands of Brandenburg, is, even at the present day, much under-estimated, especially by the inhabitants of the cities of Western and Southern Germany, which possess an older history, and are situate in more charming or grander surroundings. But the advantageous position of the Prussian and now German capital have long been acknowledged by competent critics, who have, at the same time, seen in it a guarantee for a still more brilliant future. Although it cannot be denied that Berlin is much indebted as to its growth to the steady development of the State of Brandenburg and later Prussia, and the direct personal influence of some of its far-seeing and energetic rulers, it could never have risen to its present importance if it had not, at the same time, possessed the natural conditions necessary for a favourable material development. These conditions are its remarkable central position, which mark Berlin as the natural point of gravitation not only for political formations, but also, and still more, for commerce and intercourse. Irrespective of its central position in Prussia herself, it is situated at almost an equal distance from Königsberg, Warsaw, Cracow, Vienna, München, Stuttgart, Carlsruhe, Strassburg, and Aachen; again, in a wider circle from Paris, Dover, Christiania, Stockholm, Riga, Brody, Pola, Milan, and Geneva. The advantages of such a situation are enhanced by the favourable nature of its surroundings, which offer few, if any, obstacles to the construction and increase of artificial means of intercourse. Besides being connected by canals with the Oder and Vistula on the one hand, and the Elbe, which it is intended to join to the Rhine, on the other, Berlin is the centre of fourteen high-roads and eight lines of railway, to which shortly three more are to be added.

Thus much of the geographical position of Berlin. As regards its topography, little can be said of the surrounding landscape. The city is situated in a rather low depression of the great North German plain, the zero point of the level of the Spree at Berlin being only 99 ft. above the level of the Baltic. The neighbouring country is a uniform flat, with a few swells nearer Berlin, which, as they fall off pretty sharply towards the valley of the river, look like two ridges extending towards the north and south of the city. But even the highest elevation, south of Berlin, the Kreuzberg, is only 112 feet above the level of the Spree. The latter, in its tortuous course through Berlin, divides into two arms, forming the island on which the oldest part of the city, called Köln, is situate. The greatest width of the Spree valley near Berlin is about 11,900 ft., and this width is at present almost completely filled up by the buildings of Berlin, which, in some places, extends over the edges of the valley into what can hardly be called plateaux. Berlin is generally described as being situate in a sandy plain. This is a mistake, as the works for the draining of Berlin have amply shown. The soil consists of a deposit of vegetable soil of an average thickness of 5 ft., which, in some cases, increases to 20 ft., followed by alluvial deposits of generally 33 ft. thickness. Consequently, the lower-lying districts, so far as they are not yet covered by buildings, have been changed into fertile garden land, where vegetables are grown, the original meadow-land having almost entirely disappeared. There are still remnants of the extensive forests which once covered the ground, which, with the new parks which have been laid out round the city, relieve the monotony of the plain, while the great forest tracts known by the names of the Grunewald and the Köpnicker Forst reach within three miles of the boundary of the city.

Under the name of Berlin as now understood are included all those districts which are situate within the city boundaries as fixed in 1861. They form a separate administrative district in the government of Potsdam, but it is intended to organise the city as an independent province. Its present division is a jumble of the most various systems, all independent of each other,

* Berlin und seine Bauten. Herausgegeben vom Architecten-Verein zu Berlin. Mit 670 Holzschnitten nebst 8 Kupfer- und Karten-Beilagen. Zwei Theile. Berlin, 1877. Eigenthum des Vereins. London: Williams & Norgate.

and all acting as if there were no others co-existent, which leads, of course, to a most delightful state of uncertainty and confusion, and a clashing of interests. London is not unique in this respect. But, of the two, Berlin is still worse off, as it has no Metropolitan Board of Works yet. The best known and most popular division is that into quarters, of which it has sixteen. Of course there are further and entirely different divisions for purposes of taxation, there are police districts, and there are twenty-nine parishes. Besides this, the city is divided into different districts of jurisdiction, there are postal districts, and there are fire brigade districts. Finally, there are distinct parliamentary and municipal election districts. All this confusion, it is hoped, will be swept into the limbo of the past when the great change already referred to takes place.

As in most old towns, side by side with the grandest buildings of modern times, we find relics of the past. The latter, however, are getting scarce; there are very few buildings left from before 1688; but the period of transition from the seventeenth to the eighteenth century is represented by a number of monumental erections. The spirit of modern times has made itself felt most recklessly. Whole quarters have been levelled in favour of public buildings and larger residences. Thus a mixture of ancient and modern buildings meets the eye, especially in the older parts of the city. Of important public erections, there are a great many; they are principally concentrated round the Royal Castle, the Museums, and the Armoury. Though these give those quarters the appearance of a capital, the general aspect of Berlin is that of a great trading town. We might dilate still further on the principal features of the city, but must refer the reader to the book itself, and remark only that Berlin, like all large cities, has its suburbs, their general character being of a half rural, half urban nature.

The area of the city boundary covers 14,629 acres. Of this, much is owned by the State or the Municipality; it is difficult to make even an approximate estimate of its value. But the amount to which the buildings are insured was given in 1872 at 980 million marks (49,000,000*l.*), which is much below their real value; their rateable value being returned at 1,182 million marks (59,100,000*l.*). The prices given for different (freehold) plots vary with the locality. Small plots, the purchase of which could not be avoided because they were required for particular purposes, fetched as much as 2,500 marks (125*l.*) per square mètre (10·764 square feet). The average price of ground in the best business locality of Berlin is at present 850 marks (42*l.* 10*s.*) per square mètre, or nearly 4*l.* per square foot; while in the fashionable quarter, round the Zoological Gardens, the value per square foot ranges from 1*l.* 8*s.* to 3*l.*, and in more distant districts and in the workmen's quarters 4*s.* 6*d.* to 7*s.* per square foot. Rents are correspondingly high. The rental value in the first quarter of 1872 (this period seems to have been selected because rents were then highest on account of the briskness of business; it was the height of the *Gründerperiode*) of the 173,603 residences (flats they would be called here) was 88,750,000 marks (4,437,500*l.*), or on an average 513·6 marks (25*l.* 10*s.*) per family residence. Rents have almost doubled since 1840. The number of inhabitants was, on the 1st of December, 1871, 826,341 persons, the two sexes being almost equally balanced, 50·4 per cent. of males to 49·6 per cent. of females. The rate of mortality compares favourably with that of other large towns. In 1872 there were registered 35,045 births and 27,800 deaths. The increase of the population since the last political changes, which made Berlin the capital of Germany, has been rapid, and it is calculated that by December, 1875, its population was about a million.

We have now reached the second division of the first section, the historical development of Berlin. The remote history of the Mark of Brandenburg, and with it that of its capital, as well as its name, are shrouded in profound mystery. Reliable data are also wanting as to how and when the town and surrounding districts were first taken from the Slavs and colonised by the Germans. Even the period of sixty-three years including the Government of the first four Margraves since the re-conquest of Brandenburg in 1157 A.D., and the overthrow of Jaczo of Köpenick, is almost a blank. It is only in the second quarter of the thirteenth century that more light is thrown on its history. The twin town of Köln on the island in the Spree and Berlin proper on its right bank became first known under the Margraves Johann I. and Otto III.; the oldest document, in which Berlin is mentioned as the seat of a dean and chapter, dating from the year 1244. We pass a great deal that is said respecting the early history of Berlin, not, however, without recommending this part of the book to the archæologist, and noting the fact that Berlin formed early one of the cities of the Hansa, and that under the fourth Hohenzollern, the Elector Johann Cicero (1486–1499), Berlin became the capital of Brandenburg. The brilliant court of the splendour-loving Elector Joachim II. (1535–71), under whom in 1539 the Reformation was introduced, brought to the town the more stirring life of a princely capital. It was then also that Berlin was enriched architecturally by the erection of several important public buildings. The old castle was enlarged to a handsome edifice. But of still greater benefit proved the reigns of the two next Electors, Johann Georg (1571–1598) and Joachim Friedrich (1598–1608). Berlin was visited by the plague in 1598, about a quarter of the population falling victims to the dreadful scourge, and it suffered severely during the Thirty Years' War. When in 1641 the young Elector Friedrich Wilhelm entered Berlin for the first time, the number of its inhabitants had dwindled down to 6,000 souls.

With the reign of the Great Elector (1640-1688), who is generally considered the founder of Prussia's greatness, Berlin also entered upon a new career, the beginning of its modern development. It took several decades before Berlin recovered its former prosperity, especially as the policy of its new ruler necessitated the burden of heavy taxes, and large sums were expended on converting Berlin into a regular fortress. When the Great Elector died, he had done much to raise his country and its capital, but it was left to his successor (Friedrich I., the first King of Prussia, 1688-1713), to make Berlin a comparatively handsome city. The reign of Friedrich Wilhelm I. (1713-1740) was of less importance to the development of Berlin; the benefit, however, conferred by his reign must not be sought in the number of public buildings erected by him (he was too parsimonious for that), but rather to the measures he inaugurated for raising and enlarging his capital. Under him two great undertakings were begun and almost completed: the enlargement of the Dorotheen- und Friedrichstadt, and the demolition of the fortification, which had for almost a century retarded the growth of Berlin. With regard to the first of these works, the measure of forcing those of the Berlin citizens who were thought to be possessed of a certain capital to build houses, whether they liked it or not, will long be remembered as perhaps the most arbitrary of that most despotic monarch Prussia has had. Some of those houses are still in existence in the southern part of the Friedrichstadt.

During the reigns of three monarchs (from 1640—1740), Berlin had increased fifteen times its number of inhabitants and in size. The next century witnessed its rise from a larger city of Germany to a capital of European importance. The merit of having effected this change belongs to the prince who raised the little kingdom of Prussia to a great power, Friedrich II., known in history as Frederick the Great (1740—1786). Although but seldom within the walls of his capital, the "Grand Monarque" of Prussia was as careful of its interests as his predecessors. The great king did already much for it during the eleven years between the Second Silesian War and the Seven Years' War; but after the final conclusion of peace, in 1763, and during the remaining twenty-three years of his reign, his activity for the welfare of his country and his capital was extraordinary. Berlin will ever honour his memory. Perhaps no monarch worked more laboriously than he did for healing the cruel wounds inflicted by the long, and, though victorious, yet ruinous wars. Berlin had also suffered much. The number of its inhabitants, which was 126,600 souls in 1756, had, in 1763, sunk to 119,300, including its garrison of 19,500 men. Frederick encouraged and aided the building of private houses in all possible ways, besides carrying on the construction of public buildings. We find most carefully recorded in the work before us all Frederick the Great did for his capital, and how all he had inaugurated continued to bear fruit after his death. The reign of his successor (Friedrich Wilhelm II., 1786-1797),—as little as it redounded to the credit of Prussian history, yet was of immense benefit to Berlin, and brought its prosperity to a point it had never before attained. But it experienced a most extraordinary change of fortune under its next king, Friedrich Wilhelm III. (1797-1840),—a still greater brilliancy of the artificial lustre shed upon the capital of the Prussian monarch, the rapid fall from this height under the oppression of a triumphant enemy, finally the beginning of a healthy and organic change to a real metropolis. During the French occupation the number of its inhabitants had declined by 30,000, and it took long years of patient work and economy before Berlin attained to its former height; however, it must be owned that the patient work was crowned with ultimate success. When Friedrich Wilhelm died, in 1840, the number of inhabitants of his capital was 328,692 souls,—it had been doubled within thirty years.

What Friedrich Wilhelm I. and Friedrich II. had prepared, what the counsellors of Friedrich Wilhelm III. had patiently worked for,—the elevation of Berlin to an important centre of trade and industry,—was accomplished with surprising rapidity and steadiness under the changed conditions wrought by the introduction of railways. This innovation in the mode of intercourse has perhaps contributed most to the enormous increase of Berlin, which has eclipsed in its growth since 1840 its rivals, Moscow, Naples, St. Petersburg, and Constantinople, and is now not far from vanquishing Vienna in the race for being the third great capital of Europe. In Friedrich Wilhelm IV. a king had ascended the throne whose ambition it was not to be behind his ancestors in the cultivation of arts and sciences, and whose beneficial influence on the development of Berlin was not fully recognised till after his unfortunate death. We have had occasion to refer to his great schemes for beautifying his capital,* some of which have been carried out, while many others left by the art-loving monarch, especially his plans for the rebuilding of nearly all the churches of Berlin dating from the eighteenth century, were doomed never to be realised. During his reign five railway termini were constructed, the great waterworks of Berlin were established, and the number of public and private buildings constructed during the same period is really something marvellous.

With the accession of the present King and Emperor, Wilhelm I., the last epoch of the development of Berlin was inaugurated. As short as this period may seem, it may be divided into three sections: the first, extending from 1861 to 1866, being named the "new era," in connexion with the regency of the present emperor,—which gave rise to so many hopes. Berlin kept on steadily increasing, and with this increase the population augmented rapidly. While the number of inhabitants had risen in the years from 1849 to 1860 by only 72,000 souls, the addition to it in the four years from 1860 to 1864,—in the latter of which years 632,395 inhabitants were counted,—was no less than 136,500 souls. The next section, including the years from 1866 to 1871, bears in many respects the stamp of a period of transition. Like the Prussian State, its capital had taken up a higher position, and continued steadily in the onward march of its development. The new laws of settlement and free trade of the German Empire sweeping away all the old restrictions imposed by the several puny states of the former Confederation on the free movement of their respective citizens, favoured in a great measure a steady influx of new elements into Berlin. The census of 1867 showed its number of inhabitants to be 702,437 souls; by 1870 it had reached nearly 800,000. The importance of Berlin as a centre of commerce and speculation of the first rank, as a nucleus for European trade and industry, increased amazingly. Yet there were unfavourable periods. Dreads of approaching political complications, stagnation of trade and industry in consequence of the rise in the price of labour and socialist movements amongst workmen, and other causes, all affected and impeded temporarily the prosperity of Berlin, and thus it happened that its material progress was behind just expectation and even the requirements of the time. The war of 1870–71 naturally did much to retard still more all advancement, and the important event which was the upshot of that great struggle, the union of victorious Germany into a new confederation of states under the leadership of Prussia, found Berlin in a state of unreadiness and slumbering projects both of a public and private nature. Then followed that

* See the *Builder* of May 27 and June 17, 1876.

period of an almost morbid self-confidence and speculation, of which naturally the new capital was the centre, the movement there being unfortunately seized upon and manipulated by unclean spirits, which ended in that senseless period of speculation and building from which Berlin is only now partially recovering, without having yet been able to realise completely its disastrous effects. Speculative building operations were only one, but a principal one, of the features which characterised that period. The sudden influx of population (55,000 souls in 1871) increased the want felt already in former years to a serious house famine. Numerous building societies were formed in consequence, the price of the soil increased fabulously, speculation seized the opportunity, bubble companies sprang up like mushrooms, and when, under the circumstances inevitable, the final crash came, the forty societies formed during 1873 alone had most of them advanced no farther than the first steps, whole estates had certainly been acquired, whole streets had been laid out, but the real want of houses had only been very partially supplied. Rents are still as exorbitant as ever, and it is only the future which promises to supply the remedy for all the evils produced by pernicious over-speculation.

We will carry on our review in another article.

A VISIT TO THE ROSLIN GUNPOWDER MILLS.

Sojourning some time ago near the beautiful and romantic village of Roslin, and while the public mind was still startled with the explosion of the first Turkish ironclad on the Danube, we chanced, in our solitary walks one morning, to come upon a gunpowder-mill. It at once occurred to us that most of our readers might not be displeased with some account of it. The ancient and honourable firm of "Hay, Merricks, & Co., Roslin Gunpowder Mills, near Edinburgh," —one of the largest in Scotland,—has recently merged into a limited liability company (like most of the staple manufactures of the country), and, of the members of this company, our thanks and acknowledgments are chiefly due to Mr. William Merricks, and to Mr. T. Morton Johnston, the manager, who not only gave us free ingress and egress to the works, but who also provided us with a qualified *cicerone* in the person of Mr. A. F. Hargreaves, the chemist to the establishment.

It would of course be out of place in this connexion to enter on the great question of the history of gunpowder, and more especially of its archæology; but a few preliminary paragraphs are absolutely necessary in order to render our descriptive matter intelligible.

As to the much-vexed question of the discovery of gunpowder, the Chinese are beyond all question entitled to precedence in the order of time,—although the Hindus, and even the Greeks, are probably each entitled to an equal share of originality. In point of fact, gunpowder, as invented by Berthold Schwartz and Roger Bacon, differed in no essential particular from the celebrated Greek fire of the Byzantine emperors, nor from the terrestrial thunder of China and Hindoostan. Nitre, as Sir George Staunton points out, is the natural and daily produce of China and India, and there, accordingly, the knowledge of gunpowder as an explosive compound seems to be coeval with that of the most distant historic events. When these people first applied this power as a propellant force with firearms, which they certainly did also in some half-barbarous fashion, is less easily determined. The question, however, is of no practical consequence; nor can we say much more with respect to its Mediæval relations under the Persians, the Arabs, or the Moors. The plain fact is, there is little importance in the history of gunpowder until it came to be used in guns; and, since the employment of firearms in Europe only dates from the beginning of the fourteenth century, it may be safely inferred that their employment in other quarters of the globe could not have been general at an earlier period. "Before that date," says Colonel Smith, in his able and recondite military treatise, "there is as little interest attached to gunpowder as to the history of steam before the days of Savory, Newcomen, and Watt."*

The introduction of the use of gunpowder with firearms had the effect, we need hardly point out, of revolutionising the whole art of European warfare. The mailed warrior and the mailed horse disappeared, as Carlyle has somewhere said, "into the hollow eternities!"—not without a howl of execration on the part of the feudal nobility. "The new arms," observes a recent French writer,* "were considered alike discreditable and dangerous to an army; and there was very little chivalry, if not positive disloyalty, in their usage." "Que nous sommes loin de ces temps!" he adds, with a philosophic shrug. On the other hand, as artillery became more general, so the actual slaughter of a battle diminished; just in proportion as the "shock of demoralisation" preponderated over the hand-to-hand conflicts where a victory was only won after there were no foes left to slay. A battle as great as that of Crecy it has been asserted might now be gained with a loss to the vanquished of not more than 1,000 men, instead of the 30,000 who are said to have fallen victims to the English sword, bill, or bow.† Finally, gunpowder, as Shakspeare uses it by the light of his genius, must have been a most potent corrective of cowardice,—as witness the foolish speech of the trimly-dressed, perfumed, and popinjay lord to Hotspur, on the battlefield of Holmedon, as to "that villanous saltpetre; dug out of the bowels of the harmless earth:"

> "And but for these vile guns,
> He would himself have been a soldier!"‡

We cannot, however, pursue this interesting subject; and can only add that most of the gunpowder used in England previously to the reign of Queen Elizabeth was imported from Flanders. But, about the year 1590, George Evelyn, grandfather of the celebrated author of the "Diary," received a licence to set up powder-works at Long Ditton and Godstone. Soon afterwards, the Evelyns were appointed sole makers of gunpowder in the South of England, on condition of delivering into the royal store every year a certain quantity of "good serviceable powder." The mills at Faversham, which afterwards became a royal factory, were established about the same time; and it appears that the present royal factory at Waltham Abbey can boast of as great an antiquity; which royal factory, by the way, as it stands at this moment, is unquestionably the model gunpowder-works of the whole civilised world. From England, the manufacture spread to Scotland, and even, we believe, to Ireland, since there was for many years a Government gunpowder-mill at Ballincollig. Colonel Smith's official handbook, cited above, is our authority for these particulars; and we may as well add that it has been our chief guide through the somewhat sombre technicalities of the gunpowder manufacture.

Gunpowder, to give the best definition of it we can find, is an intimate mixture of certain proportions of nitrate of potash, sulphur, and carbon; or, if we must use the popular parlance of the powder-mills, of nitre, brimstone, and charcoal. The relative proportions of these ingredients vary with the quality,—but the constituents themselves never vary. "Although gunpowder," says an able writer,§ "is the oldest, it is still the best of all known explosives for warlike purposes, and, although with the exception of some improvements in the details of the manufacture it is the same as it was centuries ago, 'when a ground handful of nitre, sulphur, and charcoal drove monk Schwartz's pestle through the ceiling,' it is the only substance which chemistry has discovered that can be used with safety to propel a bullet from a gun. Amongst the many improvements which have been made in all the appliances for slaying human beings, gunpowder, the mainspring of them all, has remained unchanged. Many other explosives, most of them of recent date and more powerful in their action, have been brought forward and tried,—but the very intensity and suddenness of their explosions are the causes of their rejection." Even ordinary gunpowder is found too sudden and trying in its explosion for the monster guns of the day; and the problem with all good artillerymen at this moment is to devise some effective means of modifying and controlling its disruptive force. For example, a charge of dynamite or gun-cotton would instantaneously destroy the strongest gun it is possible to forge! We shall have to explain this phenomenon as we proceed. In the meantime, let us repeat that whatever may be the nature of the firearms, gunpowder, in some one or another of its forms, must always be the *motif*. Ships may improve their armour, guns may increase their calibre, but gunpowder has never changed its constitution. Like good bread and good wine, this formidable compound of combustible chemicals seems to have reached its perfection in the dim twilight of remote history. Sulphur, carbon, nitrate of potash: this "triple alliance," as it has been styled,—this unholy alliance, as some would say,—these three constitute gunpowder, and the greatest of these is the nitrate of potash.*

We will now proceed to take the reader with us in a glance through the mills at Roslin, premising that all attempts at a systematic or exhaustive description of them would be quite impossible within our prescribed limits.

The picturesque valley, or rather glen, in which the Roslin Gunpowder Mills lie embosomed, is certainly one of the loveliest pieces of landscape we have come across in the whole of our rambles throughout Scotland. It forms one of a series of those exuberant woodland glades and dells full of picturesque beauty and true natural loveliness, through which the river Esk winds its devious and serpentine course from the Pentland Hills to the estuary of the Firth of Forth. This series of glens includes such delicious morceaux as Woodhouslee, the woods of Hawthornden, Dryden, Polton, Melville Castle, and other beautiful scenes familiar to every tourist in Scotland, and especially so to all true admirers of Scottish poetry and song.

Somewhere about a century ago the paternal ancestor of the present Messrs. Merricks pitched his warlike camp on the estate of Sir Norman Lockhart,—on which principle of tenure in the feudal law of Scotland we did not too curiously inquire. The water-power of the river Esk was, of course, the first consideration; the second, the great abundance of timber and coal. But the natural peculiarities of the ground were carefully taken advantage of to insure the surrounding population from the perils of an explosion. On the one side of the valley is a very steep natural declivity; on the opposite banks of the river the rocky and precipitous cliffs tower to an altitude of more than 100 ft. Indeed, the whole works are almost hidden from observation, and as completely buried in the beautiful valley glen as if a natural grave had been prepared for their reception. There are three gates to the works: first, the principal entrance (the east gate), on the road from Roslin to Rosewell; the upper gate, leading to the manager's house, abutting on the road to Pennicuick; and, finally, the Kirkettle gate, which lies about a mile to the westward.

The buildings, as we have said, are completely isolated (indeed, the pavilion system is here carried out, for obvious reasons, to its extreme consequence), and they resemble each other closely in general contour and construction. Most of them are built of stone, red tiled and slated, usually of one story, from 25 ft. to 40 ft. square on the plan, with very few window openings, and those extremely small. Here and there a picturesque chimney projects against the sky-line, decorated on the corners and cornice as becometh the surrounding scenery. Some of the buildings are formed by a combination of stone and timber, according to the purpose of the house; some are built of brick, and others are wholly of timber. Indeed, it is preferable, we are informed, in gunpowder works to have slight timber buildings in some cases, especially for the mills, as in the too possible event of an explosion the timbers are simply scattered about, and may be reconstructed. But whatever may be their character, the whole buildings,—the magazines, even the very offices and gatekeepers' lodges,—have a sombre and *grave* appearance. A strange silence prevails, and seems to infuse its gloomy influence into the very hearts of the gunpowder artisans. Miss Muloch, who visited the Roslin Gunpowder Works some twenty years ago, has in her usually sweet descriptive style the following observations:—"The green lane broken into an open space, blackened with *débris* of an unknown kind; the running stream was caught and diverted into various mysterious channels, or led

* A Handbook of the Manufacture and Proof of Gunpowder, as carried on at the Royal Gunpowder Factory, Waltham Abbey. By Captain F. M. Smith, Royal Artillery Assistant Superintendent. Printed by Order of the Secretary of State for War. London: H.M. Stationery Office, &c. 1870.

* Fernand Papillon, in the *Revue des Deux Mondes*, Juillet, 1873, p. 400.

† See Chambers's Encyclopædia, and the authorities cited, vol. iii., p. 338.

‡ First Part of King Henry IV., act i., sc. 3.

§ In the *Quarterly Review*. Vide vol. cxxv., p. 168.

* The reader who wishes to pursue this subject should consult Sir William Congreve's works, *passim*; and also with great advantage the late Emperor Napoleon's "Etudes sur le Passé et l'Avenir de l'Artillerie," vol. iii. Paris. 4to. 1862.

under water-wheels in dark buildings, of which the doors seemed sedulously kept half-closed. Another peculiarity of these buildings was that each was planted separate within a considerable distance of the other. Between them a few workmen were moving about with that grim cautiousness which seemed the characteristic of the place. There was none of the careless jollity one usually sees in a manufacturing community; everybody seemed to go about as if he had something on his mind.*

Although by no means so dingy in their external appearance as some other factory buildings we could call to recollection, the gunpowder houses have a singular resemblance in their character to the pencil-mills at Keswick, which, as some of our readers may remember, we described several years ago,† and as charcoal and plumbago are common to both industries, there exists a certain, although remote, basis for the likeness.

1. The first of these odd-looking gunpowder-houses to which we were introduced was the charcoal-house. Charcoal, we need hardly say, is produced when any organic substance is strongly and continuously heated out of contact with air,—a process, in fact, of destructive distillation, or, to be more precise, in the present case a carbonisation of wood. The kinds of wood which are generally used for the manufacture of gunpowder-charcoal are the black dogwood (*Rhamnus frangula*), the willow (*Salix alba*), and the alder (*Alnus glutinosa*). These woods are all well adapted for the purpose of conversion into charcoal; but the dogwood alone, which is really the alder-buckthorn or berry-bearing alder, is always used for the best sporting gunpowder. Beech makes very bad charcoal; so does fir; and oak is probably the worst timber for this purpose under the sun.‡ Great stress is laid by the makers on the cleanness of the wood used for charcoal; any traces of bark adhering to it constitute an impurity. As we entered the works, we saw several cartloads of this green wood being delivered; and the first process in the manufacture is to strip it of its bark. After being stacked for a certain time, it is taken to the charcoal-house (at the door of which we and our readers have been standing for the last quarter of an hour), where it undergoes a thorough metamorphosis.

The charcoal-house consists of a large square brick building, with a tall chimney, and contains a double range of huge iron retorts or cylinders embedded in furnaces, and surrounded by flues of a peculiar construction. Here the wood is introduced by means of sheet-iron slips, and the cylinders sealed with iron doors secured by a powerful iron screw much in the same way as the ends of gas retorts are fastened. The process of charring then goes on, which occupies from sixteen to eighteen hours, depending on the size of the wood, and the capacity of the cylinder. The amount of charcoal produced is usually about 20 per cent.,—that is to say, one ton of timber produces five cwt. of charcoal. The waste gases in this process, it is important to observe, are utilised by passing them into the flues underneath an adjoining set of cylinders, and constitute, in fact, the most valuable part of the fuel. After the charcoal is taken from the cylinders it is placed in iron coolers provided with tightly-fitting lids, and allowed to stand for twenty-four hours, by which time it is quite cold, and it is then shot into the store-bins. This charcoal is next reduced to powder by grinding in a neighbouring mill exactly of the type and pattern of a large coffee-mill, and is afterwards passed through a wire reel, and then a silk sieve to exclude all foreign particles, such, for example, as a small piece of stone, or a rusty nail. It is then ready for the mixing-house. The fitness of charcoal for gunpowder depends alike on its chemical composition and its physical qualities. When properly made it should be jet black in colour, its fracture should show a clear velvet-like surface, and it should be light and sonorous when dropped on a hard surface. Underburnt charcoal, however, it is proper to mention—that is, charcoal prepared at a very low temperature, and easily distinguished by its reddish-brown colour—has recently been used with good effect for small-arm powders. It certainly renders the powder more inflammable, but it suffers under the disadvantage of being more hygroscopic than denser charcoal, and therefore of rendering the powder more liable to the influences of damp.* Charcoal is the only element of the compound which should be kept or "aged" before admixture, and is all the better for keeping, as they do at Roslin, for six days; otherwise it exhibits a strong tendency to spontaneous combustion.† To conclude this part of our subject, we shall just add that charcoal, although chemically a simple substance, is the ingredient of gunpowder which is least understood. "Chemical analysis fails to answer the question why one kind of wood affords a better charcoal for powder than another; so does microscopical examination. All that can be said is that the lighter woods generally yield lighter and more combustible charcoals: and yet the dog-wood (or wild cornel tree), which makes the strongest of all powders, and which is exclusively used for the fine powder employed with our breech-loading fire-arms, is a dense, comparatively-heavy, slow-growing wood. In the elaborate researches of Bunsen, Schischoff, and Von Karolyi, respecting the products of gunpowder, this question of different descriptions of charcoal seems to have been entirely overlooked; and unfortunately it appears to be one not easy of solution. For even the charcoal of a single species of wood is found to vary not only in density but in chemical composition with the temperature at which it has been produced.‡

2. The next ingredient of our triple alliance is sulphur; which, however, as its properties are so well understood, we may dismiss with little notice. Sulphur is found partly free and partly combined with other elements. At present by far the greatest quantity of our commercial supply comes from Girgenti, in Sicily; but it is well to know, and should never be lost sight of, that we are by no means dependent "on the foreigner" for sulphur, as the element can be easily extracted from the iron and copper pyrites, so abundant in this country.§ This crude sulphur is refined in the "brimstone-house" of the Powder Works by a process of distillation, or rather of sublimation, which we need not stay to describe, although it is one of the most beautiful processes in the whole range of practical chemistry. The crude sulphur is heated in a large cast-iron retort, about 5 ft. in diameter, to a temperature of about 700° Fahrenheit; when the sulphur passes over in vapour, and is condensed by means of coolers, it is then found to be almost absolutely pure. As an ingredient of gunpowder, sulphur is chiefly valuable on account of the low temperature (about 500° Fahrenheit) at which it inflames "thus facilitating ignition," as Professor Bloxam observes, "and accelerating combustion." This is not a distinction without a difference with respect to the explosion of gunpowder, as we shall presently see; on the contrary, it is a most important characteristic of the chemical action. The distilled and purified sulphur, after being removed from the "brimstone tubs," is broken up into large lumps, which are ground under a small pair of mill-stones. After being ground and sifted, it is ready for the mixing-house.

3. We now come to the third and last and most potent ingredient of our triple compound, the nitrate of potash or saltpetre. In order to study this deflagrating substance properly we must enter the "saltpetre-house," a large square stone building, with a pavilion roof and a tall, square, ornamented chimney-shaft, situated very near the centre of the works. Saltpetre, which constitutes three fourths of the mixture of gunpowder is properly regarded as its mainspring. Our chief supply is obtained from our Indian Empire, mostly from Bengal and Oude, where it occurs sometimes as a white encrustation or an efflorescence on the soil, and sometimes as disseminated through its upper stratum. In both of these cases the result, we were given to understand, is due to a peculiar electrical condition of the atmosphere acting on the potash salts contained in the soil which constitutes the nitre beds. The crude nitre as we import it is obtained by lixiviating this nitrified soil, and allowing the solution to crystallise; and this "grough saltpetre," as it is technically termed, comes to us packed in bags of coarse sacking, which we observe plentifully strewed about. To refine and purify this grough stuff constitutes the next process of the manufacture, which, although borrowed from the French, is a very simple and beautiful process; and depends entirely on the physical law, that nitre like many other salts is very much more soluble in hot than in cold water. The impurities always present consist generally of about five per cent. of chloride of sodium and various salts of lime (technically termed "the refraction") do not possess this peculiarity of solubility at different temperatures, and accordingly the saltpetre is crystallised and recrystallised from the saturated solution when cooling; while the impurities are left behind. We should mention here that the "saltpetre-house" is copiously supplied with water; and is so constructed on the evaporating-beds that the solutions of nitre gravitate from the first process to the last, where the liquid pumped out is almost perfectly pure nitrate of potassium. From this solution the final touch of crystallising is given; and after washing these crystals the saltpetre is transferred to the store-bins the day after it has been refined; where it remains (generally three or four days) until it is required for use in the mixing-house.

We should state here a circumstance with regard to which we made particular inquiry, that neither in this process of refining the nitrate of potash nor in any other in the whole manufacture does the slightest impurity arise which is capable of contaminating or polluting the river.

The intelligent reader will now perceive, on glancing over the three previous paragraphs, that we have got the tri-basic ingredients of gunpowder,—the charcoal, sulphur, and saltpetre,—properly pulverised, purified, refined, ground, and sifted to the requisite degree of fineness, all marshalled abreast of each other, like the three divisions of an army, and ready to be combined in their respective proportions. Our trio must now become uno, and this vital step in the process is effected in the "mixing-house." But, thereby hangs a tale. We are now to enter upon what the common and statute law of the country describes as *dangerous ground*, and thereupon exacts from us and all persons whomsoever certain wise precautions calculated to preserve our own lives and the lives of others of her Majesty's lieges who may be concerned in the manufacture. In plain language, we have here for the first time to make some change in our costume. We had, in the first place, a dress furnished to us consisting of a woollen blouse and overalls, destitute of buttons or button-holes, but profusely supplied with latchets, in which garments we promptly enveloped ourselves; and secondly, a pair of the most monstrous boots we ever had the misfortune to encounter,—boots like those of a Russian Tartar of Kamschatka, or rather more like an Esquimaux snow-boot without the sealskin lining, the which boots we were enjoined to put on and take off every time we made our entrance or exit from a "dangerous place," or what is termed in powder-work phraseology, "a clean floor." Our *chapeau* we may mention, being of a mild and inoffensive character, was left *in situ* and untouched. We may add here that when we entered the gate, or, at least, on leaving the office, we were politely requested to divest ourselves of all such superfluities as lucifer-matches, vesuvians, cigar-lights, or any steel articles, such as a penknife or a pocket corkscrew, or a bunch of keys, or, in fact, of any material which could aid in producing fire, or any electrical conductor.

But we must hurry on. The process of mixing is a very simple one. The relative proportions of the three ingredients are weighed out in the respective ratios of—

Nitrate of Potash	75	per cent.
Charcoal	15	,,
Sulphur	10	,,
Gunpowder	100	centum.

Of these quantities about 50 lb. or 60 lb. at a time are transferred in bags to the "mixing machine," which consists of a hollow drum of gun metal, which is made to revolve at a speed of forty or fifty revolutions per minute. In the interior of this drum a series of arms or fliers are also made to revolve at twice that speed in the opposite direction. After revolving a few minutes this

* See an article entitled "Through the Powder Mills," *Chambers's Journal*, vol. xv., p. 308.

† See "A Visit to the Keswick Pencil Mills" in our volume for 1865.

‡ "It is a curious fact that Marco Greco, a writer who flourished before either Schwartz or Roger Bacon, recommended particularly the charcoal of *willow*. We also find, from the same authority that as early as the year 1414, King Henry V. ordered twenty pipes of *willow* charcoal to be made into gunpowder.—See the historical section of the article "Gunpowder," in the eighth edition of the "Ency. Brit."

* See Captain Smith's "Handbook," cited above, p. 31, for some interesting experiments conducted at Waltham Abbey, in which it was found that red charcoal powder gave a higher velocity to the projectile. Comp. also Tomlinson's results obtained with rockets, p. 34.

† For some experiments on this subject see "The Analysis and Properties of Gunpowder, and its Crude Constituents." By Andrew Fuller Hargreaves, F.C.S. 8vo. London: Heywoods, 1875. p. 20.

‡ *Quarterly Review*, vol. 125., p. 110. Bunsen and Schischoff's investigations are detailed in Poggendorf's "Annalen," vol. 102, p. 321, et seq.

§ The method of obtaining sulphur from iron pyrites, a process usually performed on a very large scale, is described in Miller's "Inorganic Chemistry," 2nd edition, p. 154.

drum is opened at the bottom, and the ingredients (now thoroughly mixed) are allowed to fall down a shoot into a tub, from which they are sifted, put into bags, tightly tied up, and then transferred to the incorporating mill. This "green charge," as it is called, of the fresh mixed ingredients which we must now speak of in the singular number is just a species of inchoate gunpowder, and differs from gunpowder simply from the circumstance of not being so easily ignited and being slower in combustion. Nevertheless, it is highly explosive; and an explosion in the mixing-house, when it does occur, is far more severe and terrible in its consequences to human life than one arising from any other cause, on account of the slower but deadlier action of the flame which burns into the very bone instead of scorching and dashing its victims to pieces, as the finished gunpowder does. This "mixing-house," we may observe, constitutes the first "danger building" in the highly expressive nomenclature of the Explosives Act (38 Vict., cap. 75), and although it is the dirtiest, dingiest, and dustiest house we saw in the whole manufactory, it is notwithstanding legally "intituled" "a clean floor," that is to say, a floor on which we dare not tread without the Patagonian boots and the relative costume we have described.

The next stage in this dangerous and explosive investigation is the process of "incorporating," which is, without doubt, the most important in the whole manufacture. In point of fact, it is the process of gunpowder-making *per se* and *par excellence*; for the green charge goes to the incorporating-mill a mere mixture of ingredients, but it leaves it in the form of gunpowder. And this transformation is due simply to an elaborate process of trituration,—in plainer language, to several hours of effective milling. Since gunpowder is a mechanical mixture of certain substances, and not a chemical compound (as many people suppose), it follows, by all the laws of physics, that the more thoroughly and intimately it is mixed the better. For this purpose, about 60 lb. of the green charge mixture is transferred at a time to the incorporating house, where it is placed on the cast-iron bed of a ponderous rolling-mill, with edge-runners constructed on precisely the same principles as our well-known mortar-mills, where it is ground steadily and continuously from periods ranging from four to eight hours. Here, as we observed, the gunpowder is actually made; and made too in its strongest possible form, for really none of the subsequent processes add one single iota to its explosive powers.

The workmen on duty at this incorporating-mill do not require to give constant attendance, as the process is by far the most dangerous connected with the manufacture of gunpowder. It is only necessary, therefore, that they should enter the mill occasionally to moisten the charge with distilled water, or to rake it up from the cast-iron bed. Every possible precaution is taken to prevent explosion. The mill itself is driven by underneath gearing in order to prevent any portion of the machinery, such as a bolt or nut, from falling into the incorporating pan; and also with the view that if an explosion did occur the machinery *would escape injury*. For example, only a day or two before our visit, an iron nut was found on the floors of one of the danger houses, which caused great and immediate consternation throughout the whole factory. It was discovered in time to prevent any possible percussion, or the consequences might have been a dire explosion, with the loss perhaps of many lives. The incorporating runners are worked night and day; and the lamps burning during the night are properly protected by being recessed in the building, and uniformly lighted from the outside.

From the "incorporating-mill" which the powder leaves in the state of what is termed "milled cake" it is transferred in working barrels to the "press-house," where it is subjected to an enormous pressure in successive layers between copper plates by means of a powerful hydraulic press. The effect of this pressure on the powder, which contains sufficient moisture to make it cohere, is to reduce it to one half the volume, and to convert the "mill cake" into "press cake," a hard compact cake resembling slate in appearance, each of the layers producing one about 2 ft. 6 in. square and 1¼ in. in thickness. The use of this pressure is to give consistency and uniformity to the mass before granulation: in fact, it is on the amount of pressure which this press cake receives that the quickness or explosive qualities of the finished powder mainly depends.

The "press cakes" are next taken to the "breaking-down house," where they are broken down into pieces about the size of a small walnut by means of toothed rollers made of gun-metal; which walnuts are in their turn transferred to the "corning-house" for the purpose of being granulated.

This process of granulating, and the subsequent one of glazing we are afraid we cannot stay to describe in detail. The old-fashioned method of "corning" the gunpowder by means of a series of square sieves put in motion by a crank underneath, is now superseded by the improved granulating machine of Sir Wm. Congrave, the effect of which is to render the grains almost quite equal in point of size and density. But the granulating powder as it comes from the machine contains a large quantity of dust, which is the next object of the gunpowder maker to get rid of. The "foul grain" is therefore subjected to a careful process of sifting in revolving reels covered with cloth or wire mesh of various degrees of fineness through which the dust escapes. This granulated powder is now glazed by being put into a large wooden cylinder, about 12 ft. long and 3 ft. in diameter, making about ten revolutions per minute; and revolving all night (or at least sixteen hours at a time) by the motive power of an undershot wheel. A small quantity of black lead is added here in order to assist the glazing, and also for the purpose of giving the well-known brilliancy to the grains.

The necessity of gunpowder being *grained* is at once apparent if we consider the fact that if it were used in the form of an impalpable powder it would scarcely explode at all, at least when compressed. The ignition of gunpowder, as we have already indicated, must always be distinguished from its combustion, although these phenomena follow each other with such rapidity that they appear simultaneous. The heat evolved by each grain during its combustion, and the oxygen diffused throughout the interstices, suffices to ignite all other grains within a sphere of six times its own diameter. The granulation of the gunpowder has thus a great influence on the combustion, which means, in other words, on the strength of the explosion. In the second place, granulated powder is quite free from dust, and therefore more cleanly in its use for firearms; and, finally, it is more portable and merchantable. The uses of *glazing* the grains are threefold: the grains are rendered more symmetrical; not so liable to absorb moisture; and they acquire a better physical appearance. From this glazing operation the granulated and beautifully glazed gunpowder is transferred (always by means of the indispensible working barrels) to the "drying stores," a building about 26 ft. square, heated with steam pipes. The powder is here loosely placed on a series of wooden trays, arranged in a frame one above another, and covered with gauze. Here it remains for twenty-four hours, the powder of one day's "storing" always making way for the previous day's "glazing." After being dried in this way the powder is taken to the "dusting-house," where it is simply freed from any superfluous small-size grains and dust; after which it is packed in calico bags,—a precaution suggested by Major Majendie, the Government inspector,—inserted in gunpowder-barrels, which after being properly headed-up are ready for storage in the magazine, or for the immediate supply of the market. Where that market is; what price the commodity brings; how the home and foreign supplies are distributed; what good its consumption may do, and what harm,—these, and a multitude of such politico-economical questions, we must leave to the candid consideration of the courteous reader. Our business in this paper has lain more in the direction of production than of consumption; but a single word may be permitted to us even on this point, and that we shall give in the authoritative voice of Colonel Smith,—"No foreign nation has as yet been able to produce gunpowder which can compete with that which is made in the Government establishments, and by some of the private makers in this country," most of whom, we may add, are distinguished for their specialities in the production of particular qualities.

We had something to say about the explosive strength of the various descriptions of gunpowder. At the last operation, we saw (and heard!) it "proved" on the field by means of a mortar charged, every shot, with a certain definite quantity, loaded with a 68 lb. ball, and fired with the ordinary fuse. It was alike curious and instructive to observe the tremendous difference in the projectile power. Some sporting powder, for example, projecting the ball several hundred yards; and some blasting powder several yards only from the mouth of the gun. But this subject, as well as the nature and causes of gunpowder explosions, we must leave, with the reader's permission, for another occasion.

War, horrid war! is, over a large tract of Europe and Asia, at this moment the order of the day. Nor can it be said that warlike preparations on our own part are wholly unnecessary, for we hold it true, in common with all rational beings, that in our present state of civilisation (?) peace is alone possible, and best preserved by an intelligent and scientific state of *preparedness* for war. "Trust in God," said Oliver Cromwell, on one momentous occasion, "and keep your powder dry!" With which pithy aphorism we shall close these brief observations made at the Roslin Gunpowder Mills.

ANCIENT AND MODERN GYMNASTIC EXERCISES IN THEIR BEARING ON HEALTH.

The utility of gymnastic exercises has, in all ages, been more or less acknowledged in view of the promotion of human health and the development of agility and strength; but, like many modern exercises, the ancient ones were abused, and led to the demoralisation of human nature, and to the production of monsters instead of men. Bodily exercises, originally intended for one of the most elevating and life-sustaining ends, in time became degraded for greed and the barbaric pleasure of disgusting exhibitions.

So much was thought originally by the Greeks of gymnastic exercises that, like music and arms, they were reckoned among the liberal arts. As far back as the time of Homer, as his pages show, princes and other elevated personages exercised themselves in what was then, as well as in our own time, considered the "manly arts" of wrestling, boxing, leaping, running, and throwing quoits; and there is reason to believe that there were regular professors or masters for teaching these arts. The working or lower classes were prohibited from practising these exercises, for where princes and celebrated military heroes met and gloried in their gymnastic displays, the lower orders, who were little less than helots, were not admissible.

We find that the military heroes who were skilled in these ancient exercises did not confine themselves, like the wrestlers of a subsequent period, to one species of them, but were proficient in a number. Beautiful slaves, horses, mules, oxen, gold and silver flagons or other vessels, and articles of value were the rewards. At this time, properly speaking, there were no special gymnasiums; for the meeting was in the public forum, or other open space of sufficient size. After the Trojan war, owing to the strife that reigned, the exercises alluded to seem to have gone into disuse for some time. The Cretans and the Spartans are accredited by Plato and Aristotle as the inventors of the gymnastic arts; and the former remarks that not long ago to be a spectator of naked exercises appeared as ridiculous and indecent to the Greeks as it does now (in his time) to most of the barbarians. Aristotle observes that the Spartans were for a long time superior to the other Greeks; but when gymnasiums had been introduced by others, the Spartans were beaten easily by their rivals and imitators. About the commencement of the Olympiads prizes were given first to the runners, the wrestlers received prizes about the eighteenth and the boxers in the twenty-third Olympiad. The pancratiastic art of combined wrestling and boxing received rewards at a much later date than the above; but it appears that neither this art nor that of boxing was allowed among the Spartans,—not, it is said, because one of the parties must confess himself conquered, but on account of the danger of being maimed and disfigured.

Aristotle, in detestation of these arts, praises the Spartans for not encouraging an athletic habit of body among their young men. Why Homer should place boxing first, wrestling second, and running last, has been a subject of inquiry among the Greeks; for it appears that the two latter were the most ancient exercises, and the Greeks were of opinion that wrestling was the most difficult, and required the greatest skill. Gymnastic exercises were promoted and encouraged throughout Greece shortly after the institution of solemn games, and the combaters, or combatants, had other inducements besides

prizes held out to them for reward. Most of the towns of Greece had gymnasiums erected, and these places were looked upon as ornaments; while those who conquered at the Olympic or other games were regarded as much as defenders of their country, freed from public burdens, fed at the public expense, or otherwise received annual premiums. These were certainly strong inducements, and no doubt led to not a few evils. We find Solon endeavouring to bring these expenses within due limits; but it has been remarked by Petit and Menage that conquering athletics soon after the time of Solon had a place in the Prytaneum. The return of these heroes from the games was celebrated with great pomp. It was declared by Cicero that the conqueror in the Olympic games was esteemed by the Greeks an honour almost superior to triumphs at Rome. It is not to be wondered at that the minds of the Greeks became eventually depraved; their attention becoming so absorbed in the contests of boxers and wrestlers. The object became soon not to develope into a hardier, stronger, or more noble race, but men only thought of throwing down an adversary and gaining a prize anyhow. People sat whole days viewing their games. The finances of the State became exhausted in providing for them, and as a consequence military virtue and patriotism declined. Galen was a bitter enemy to gymnastic exercise, though he commended moderate exercise, to give agility, strength, and beauty to the body, courage and fortitude to the mind. The gymnastic exercises he protests against were those that destroyed both and rendered men unfit for either peace or war. Galen says that the gymnastic arts sprang up not long before Plato's time, but the laws of Solon have been pointed to, and the testimony of ancient writers, to show that the dangerous consequences of them had been long foreseen. As Hipprocrates, Euripides, Plato, Aristotle, and Galen inveigh severely against these exercises as they were carried on, we may conclude at least that the first four were well acquainted with the abuses in connexion, and that these gymnastic exercises must have been a considerable time in existence before their day. We find from one or more of the above authors that not only youths of a strong constitution were trained in the gymnasium, but those of a delicate frame of body, and hence they grew distorted, frequently oppressed with disorders, or carried away by a premature old age. These evils, of course, could only arise through an excess of the divers exercises gone through, and the methods by which they were encouraged, which we shall presently see. The precept of Hippocrates was despised or violated, as everything was not taken in moderation. Where the object was to throw down an adversary, or to bear the severest blows, the care was to give an immense size to the body. The pugilists of our modern days would appear to have taken a lesson out of the books of the Greek wrestlers of old. The latter were accustomed to devour flesh, and we are told particularly swine's flesh, in immense quantities, and then followed for several days immoderate exercises, uninterrupted by any sort of weather. Hours for sleep and labour became inverted, and, like brutes, they slept betimes for several nights and days together. In the effort to gain strength and bulk necessary for the prize, body and mind were impaired; and Galen, remarking upon this, declares none of them retained their strength above five years, and he compared them to walls, which having been often shaken by work like machines, fell down afterwards on a very slight attack. The changes of the weather had an effect upon them, and they were as little able to bear it as young children. The diseases they were subject to were apoplexy, bursting of blood-vessels, nervous disorders, the sudden loss of eyes, teeth, and speech. The boxing element, indeed, might be expected, in our days as well as in the times of Hipprocrates or Galen, to expose its professors to the risk of losing eyesight, tongue, and speech, notwithstanding the exercise of their so-called "manly art." Galen thinks that it is better to dig, plough, carry burdens, reap, ride, and fight, doing all these things in moderation, than to have any concern with boxing and wrestling.

The reaction must have been great when what was once considered a liberal art was at last looked upon with aversion by philosophers and despised by the greatest generals. Alexander gave these combatants no encouragement, never celebrating any of their games, despising them as persons incapable of honour or profit. They were detested by Philopœmen for rendering the finest bodies unfit for war, and because of their excesses in sleep and food they were unable to bear the fatigue of a military life.

The gymnastic life of the Greek, which we have sketched on the authority of a number of ancient writers, had its defenders as well as its assailants. It found in Lucian a strenuous defender, who took no notice of the objections urged by Plato and Aristotle. It is thought that the opinion of Lucian may be excusable, as, in speaking in Solon's name, he describes the arts only known in Solon's time, when the disasters attending them were not so common. But if we allow that Lucian, says Meiners (see Commentaries of the Royal Society of Sciences at Gottingen, vol. xi.), is speaking of the combatants of his own time, his inconsistency is not greater than that of introducing, as he does, the names of philosophers and sophists as instructors of youth who were not known in the age of Solon.

The Romans, it is pretty generally known, erected gymnasia on a magnificent scale, and in consequence of the extensive baths which were attached thereto, they were subsequently called *therma*. The exercises here were wrestling, dancing, boxing, running, leaping, hurling, and quoit-throwing. In addition there were riding, swimming, driving, climbing ropes, rowing, swinging, and mock fights, and exhibitions of various kinds, and some of them of a very savage character. Among the Greeks, before the time of Hippocrates, gymnastics moderately indulged in were considered a part of medicine; but, as we have seen from the precepts of that ancient writer and others of his nation, that exercises in part that might have long existed in their purity as a boon were converted into a curse. Moderation is a soft expression, but since the days of Homer or Hippocrates to the present, human nature has been seldom content to apply it in practice, and hence bodily ills as well as worldly ones have been legion.

We have not left ourselves space on this occasion to treat of the modern aspects of gymnastics and their bearing on mental culture and physical health, the cognate exercise of British sports periodically practised, or the constant exercise of mind, body, and limb in connexion with human manual labour. This will form the subject of another paper.

EGYPTIAN OBELISKS.

It will surely be deemed an excusable conceit if the contributors to the *Builder* choose to remember that more than half a lifetime ago the conductor of this journal told the story of the Luxor Obelisk to the Institute of British Architects only a short time after its erection in the Place de la Concorde of Paris. Nor was it possible even at that moment to conceal a little sense of shame in the admiration of French enterprise, or to stifle a feeling of regret, natural to artists and archæologists, that the prior gift of the Egyptians to England still lay half embedded on the shore of Alexandria. Indeed, the fact that the English had obtained the prostrate needle of the so-called Cleopatra pair induced the French to demand its fellow, still erect, from Mehemet Ali; and from this probably originated the report, even now reiterated, that the obelisk just arrived is simply the pendant of that which marks the centre of four vistas in Paris. Those two obelisks and the Column of Pompey, wrote M. de Verninac Saint Maur, in 1835, are the only monuments that Europe can possibly grudge of Alexandria. One of those obelisks, which was regarded as the property of the British forces after the naval victory of 1801, was formally presented to the Government of this country in 1820, and the compliment was treated with insular contumely, or, in homelier words, the gift horse was looked full in the mouth. Fifty-seven years after, — seventy-six years after Nelson's triumph,—when an English gentleman undertook to defray the expenses of its carriage to London, the offer was renewed at the request of her Majesty's ministers, by the present Khedive of Egypt. It must be difficult for foreigners,—at least for the French,—to discriminate in admiration for the British mode of procedure: the cool parsimony of power probably excites wonder, the public spirit of individuals commands respect. Historians of art may perhaps sum up the case with the assurance that Britain, superior to every form of ridicule, bore the laughter of the world for much more than half a century and saved to the State ten thousand pounds.

Mr. Erasmus Wilson, in his excellent attempt to give a popular account of "Our Egyptian Obelisk," may be similarly in need, perhaps, of excuse, different, however, from our own, when he associates the British trophy with the eyes of Abraham and Jacob, with the successes of Joseph, and with the education of Moses. According to the preface of his little book, he contemplates, and indeed has already prepared, a larger work upon obelisks, and this is to be published as soon as the imported monument is in its place.* There may, therefore, be yet time to suggest that mere speculation, which is too often permitted to undermine archæological research, should be carefully expunged from his coming book; and that though Moses may have handled his staff under the shadow of upright monoliths (at the Egyptian Heliopolis, it is not at all likely that the "ancient sycamore-tree," now to be seen close by at Matarieh, is the identical sycamore-fig under which the Holy Family lay 1,900 years ago! An event like the arrival of the obelisk, especially after delay and vicissitudes, and, worse, after the loss of six lives, is sure to call forth masses of verbiage in which errors repeated from book to book will be further mis-stated; and it is the duty of men who, like Mr. Erasmus Wilson, understand their subject, not to mar it with any recital of impossible probabilities. Not much is yet absolutely confirmed of obelisks, large and small, either carved or plain, or in a rude state, but enough is known to prevent essayists from increasing the confusion of the public mind on the subject. Oddly enough, the Part of the "Dictionary of Architecture," just published, contains the word "Obelisk," and the article thereon gives a reference to almost every writer upon the subject, thereby forming a collection of extremely valuable notes. We also have made a collection, and united in one engraving some of the important obelisks which are known to travellers, or which have been carried, through the zeal if not the cupidity of conquerors, over a thousand miles of land and more than a thousand miles of water. We have distinguished them by letters, and they are as follow:—

A.—The British Obelisk.

This monolith, of rose-coloured granite, is 68 ft. 5½ in. long from its lower extremity to the point of what is called the pyramidion. Its breadth at its widest part is 7 ft. 5 in. on two of its sides, and 7 ft. 10½ in. on its other two sides. These are the latest figures (given by Mr. Wilson), and the description is thus continued:—"From its greatest width near the base of the shaft it narrows, as it ascends to a breadth of 4 ft. or 5 ft., and then contracts into a tapering pyramid, 7 ft. 6 in., called the pyramidion. The base is rounded at the angles, possibly to give facilities for its erection. Its weight is 186 tons, and its cubical measurement 2,529 ft." This monolith had already travelled far before its departure from the African coast. Cut from the rock on the confines of Egypt and Nubia, in the quarries of Syené (the modern Assouan), just above the Tropic of Cancer, it was conveyed by water to where Cairo now stands; it was then carried over land to near the present Matarieh, called by the Greeks Heliopolis (just as Baalbec, in Syria, was called), and signifying a city of the Sun. On its way from the quarries it had passed through Thebes. To quote the Greek historian,—"From Heliopolis to Thebes is a voyage up of nine days; the length of this journey is in stades 4,860, ... and from Thebes to the city called Elephantine (almost in a line with Syené), 1,800 stades."† In this same Heliopolis our obelisk formed one of a pair placed before a temple dedicated to the Sun. From the inscription, or rather from certain hieroglyphics, it is known to have been set up by the pious command of Thothmes III. more than 1,600 years before Christ. When Egypt became a Roman province some of the obelisks at Heliopolis were carried away by the conquerors to adorn the city of Rome; and the pair of which the British obelisk formed one were taken to Alexandria, the new capital of Egypt, to be set up in front of a temple of the Cæsars. Placed there about twenty-three years before the Christian era, a few years after the death of Cleopatra, they have thus gained the popular appellation of "Cleopatra's Needles." This date is confirmed by a Roman inscription on one of the bronze supports of the obelisk still standing at Alexandria, and which refers to the eighth year of Augustus. It is now said, moreover, that certain granite foundations were

* "Our Egyptian Obelisk: Cleopatra's Needle." By Erasmus Wilson, F.R.S. Brain & Co. 1877.
† "Herodotus," ii. 9.

remarked by Mr. Dixon and his staff during the removal of the monolith; and these are presumed to be part of the ruins of the Roman temple with which the obelisks were connected. Our view is taken from a drawing by Denon in the great French work upon Egypt published at the beginning of the present century. The pedestal consists of a single block of granite placed upon three granite steps. The block is 6 ft. 6 in. (French) in height, and the three steps are together 5 ft. 2 in. (French) high. We prefer to give these dimensions direct from Denon, because it is well to keep in remembrance the fact that the "*pied de Paris*" contains more than thirteen English inches.

B.B.—Obelisks at Karnak.

The view represents one of each pair of obelisks at Karnak, near, or rather part of the ruins of Thebes. These obelisks were placed on either side, and in front, of great pyloned entrances. Their dimensions given by various writers are so conflicting that we hardly dare to mention figures. Mr. Fergusson alludes to one at Karnak, set up by Thothmes I., and he says it is 93 ft. 6 in. in height. Mr. Erasmus Wilson cites the authority of M. Mariette, and describes the great obelisk of Karnak as measuring little less than 105 ft. Dr. Birch, in his admirable "Notes upon Obelisks,"* refers to two about 70 ft. long; and to two others rising 90 ft. M. de Verninac St. Maur † makes some observations thereon which may be worth consideration at the present day, although they seem to have been disregarded when the Luxor Obelisk was set up in Paris. He remarked a certain difference between the apex of the Karnak obelisks, particularly that lying prostrate on the ground, and the apex of those of Luxor. In the former the pyramidion is "flush" ("*affleure*") at the bottom with the faces of the monolith, whereas in the latter there is a set-off of some centimètres. This leads to the inference that a gold or bronze capping originally covered the pyramidion at Luxor, and that at Karnac the granite was left bare. That a capping, if not a terminal, was usual, is certain from their inscriptions. One translated by Dr. Birch says, "He has set up an obelisk in his house of basalt, it is capped with black"; in others it is seen that some were "capped with gold" and "inlaid with gold." Some of the obelisks of Thothmes I. are said "to be gilded with pure gold." The use of the set-off remarked by M. de Verninac St. Maur is partly explained by the fact that the obelisks in Rome are capped with metal terminals, for it is not unlikely that the Romans carried with them not only the granite, but also its metallic adjuncts; and that the tradition was preserved by the Italian architects intrusted with their removal or re-erection.

C.—The French Obelisk.

If at all inclined to regard boastfully the carriage of an Egyptian obelisk from Alexandria to London, it may be advisable to remember that more than forty years ago the French not only accomplished an equal task, but they also carried their obelisk from Thebes to Alexandria. A vessel constructed for the purpose was sent from France in March, 1831, under the orders of M. Lebas, an engineer, who in a book of many pages described the whole proceeding. The vessel was taken up the Nile to Thebes, and, after three months' labour, with the aid of eight hundred men, one of the two obelisks in front of the Temple of Luxor was lowered on an inclined plane to the river where the vessel lay. The obelisk arrived safely in the Seine on the 23rd December, 1833, and it was deposited near the Pont de la Concorde. Three years elapsed; and only on the 25th of October, 1836, was it fixed in its present position. This Luxor monolith measures 76 ft. 6 in.; it was placed on the western side of a pyloned entrance to the Temple of Luxor. Ranged between these obelisks and the face of the Temple are or were four seated colossi. The sand had accumulated so as to cover the bases of the monoliths, and some time was spent in clearing the ground around them. M. de Verninac St. Maur has told us of what the bases consisted, and M. Champollion-Figeac‡ pretended that the view of the Luxor obelisk, in its original state, which he published, is the only correct one that had appeared up to that time. According to the former the obelisks rested each upon a single block of granite, and this reposed upon an inferior socle, composed of three pieces of "*grès très-dur placés de champ à coté les uns des autres.*" The height of the two socles together was not more than ten French feet, and an inscription ran all round the lower of the two. M. de Verninac St. Maur took occasion to add that the proportion of this base to the monolith seemed so good at Thebes that it was difficult to understand why the extravagant height it was then proposed to give to the pedestal, and which now exists, should be deemed necessary in France. We confess that the pedestal of the Obelisk in the Place de la Concorde, albeit the work of a man so justly celebrated as the late M. Hittorff, is the least satisfactory part of the splendid square of which it is the centre.

D.—Obelisk at Heliopolis.

Of the three pairs of monoliths which are said to have existed at Heliopolis one alone remains in its place, and this is declared to be the oldest known. It bears the name of Osirtesen. It is almost the sole relic of the ancient Egyptian City of the Sun a few miles north of Cairo, and it is thought to be 5,000 years old. One of the obelisks of Heliopolis now stands in Stamboul, another is in Rome; of the pair vulgarly called Cleopatra's Needles, one, as we said before, is erect in Alexandria, the other is to come to London. Of the fifth, of which little or nothing has been said, we may presume that man has destroyed it, or that the sands have preserved it from his touch. Three obelisks, however, are said to have been conveyed from Heliopolis to Rome.

The Obelisks in Rome.

In our view, E is the celebrated monument placed in front of St. Peter's. The obelisk itself was originally set up by Menephthah, the son of Rameses II., about 1,400 years before Christ. It is difficult to say if the stone be still in its entirety. The shaft is without hieroglyphics; of the Roman obelisks, it is only second in size to that erected by Fontana in front of the St. John Lateran Church. The obelisk at St. Peter's bears an inscription of the time of Caligula, dedicating it to the "god" Augustus, and to the "god" Tiberius. It is said to have been brought from Heliopolis in Egypt to Rome by Caligula, who placed it in the Vatican circus. The labour involved in raising it to its present position, during the reign of Pope Sixtus V., about 1590, was then qualified as miraculous. Fontana accomplished the task only after some five hundred plans were submitted to the Pope by architects and workmen. The obelisk now reposes upon four bronze quadrupeds, squeezed between the monolith and its base.

F,—The Obelisk of the Elephant, and the one from which Bernini, the guest of Louis XIV., obtained his nickname; for it was set up by that architect in the Piazza della Minerva during the reign of Pope Alexander VII., in the year 1667. This obelisk was made at the command of Pharaoh-Hophra, who reigned over Egypt B.C. 588—569, and it is therefore of the time of the burning of Solomon's Temple. Herein we quote Mr. J. H. Parker, not without fear and trembling, for he has given two dates (1660 and 1667), in his few pages about the Roman obelisks, for the second erection of this monolith. The whole monument as it now stands is about 40 ft. high; the shaft is marked with hieroglyphics, and is about 17 ft. long. Probably this elephantine erection* induced Napoleon's aspiration for a similar quadruped on the Place de la Bastille,—a work really designed by Alavoine for the site on which the present graceful column erected by M. Duc now stands. As for the origin of Bernini's idea, it is not difficult to trace a connexion with the stories brought home by travellers, and current in his time, of the "Portuguese Indies." The obelisk is made a little too lofty in our view.

G,—In the Piazza del Popolo, bears the name of Rameses II., and that of his father, Seti. It was brought to Rome by Augustus, and placed on the Spina of the Circus Maximus. It bears the Roman date equivalent to B.C. 10; and it was placed in its present position by Fontana during the reign of Pope Sixtus V., about A.D. 1589.

H,—That in the Piazza di Monte Citorio. According to Mr. Parker it was executed in Egypt by Psammeticus II., B.C. 594—588. It is said to have been brought to Rome by Augustus, and was first set up near the present Church of S. Lorenzo in Lucina to serve as the gnomon or pointer to throw the shadow on the great sun-dial which Augustus is said to have made there. It was placed in its present position during the reign of Pope Pius VI., in 1792.

I,—the Lateran Obelisk, so called because it is placed in the Piazza del Laterano. This it may be presumed is the loftiest in the world; or, at least, that it ranked with its fellow at Heliopolis, and with the celebrated obelisks of Karnak. The shaft is said to be 105 ft. 7 in. long; two sides of it are 9 ft. 8½ in. wide, and the two corresponding sides are 9 ft. It weighs about 445 tons. First brought from Heliopolis to Alexandria by Constantine, it was conveyed by the great Emperor's son, Constantius, to Rome, where it was erected in the Spina of the Circus Maximus. Now broken in three pieces, it was raised to its present position in front of the St. John Lateran Church, by Fontana, under Sixtus V., about A.D. 1588. The monolith is adorned with hieroglyphics. It should have appeared higher in our view. The draughtsman, however, is fully excused by the differences amongst authorities.

J,—Sometimes called the Pamphilian Obelisk, is inscribed with the name of Domitian. Marked with hieroglyphics, it once adorned the Circus of Maxentius. It was placed in its present position, in the Piazza Navona, by Bernini, during the reign of Innocent X., about A.D. 1651. There is a fountain round the base.

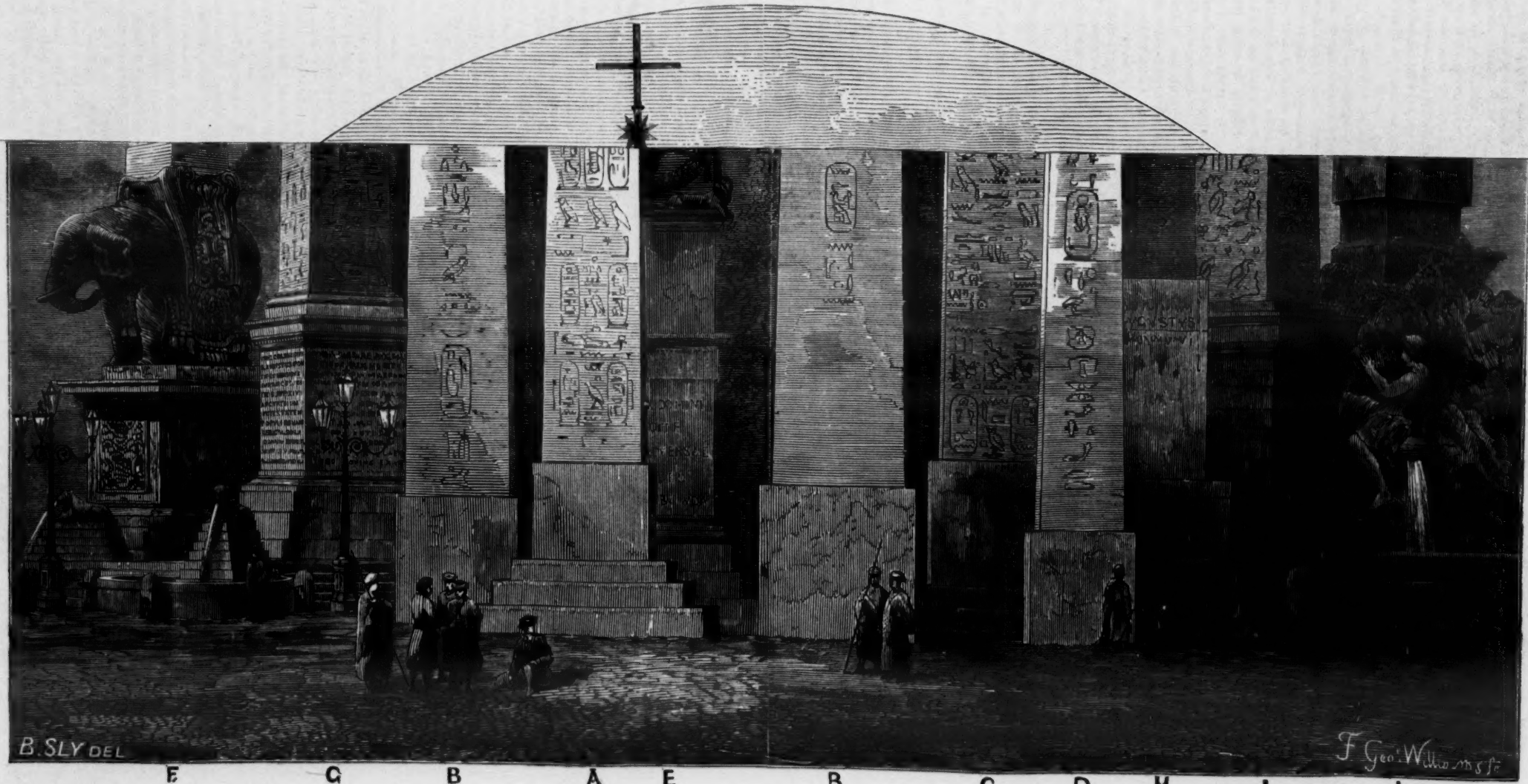
Of the twelve Egyptian obelisks in Rome two are believed to have originally formed a pair which were first set up in that city by Augustus, in front of his mausoleum. They are said to have been made about two thousand years before Christ. One is now placed in front of the Quirinal Palace, and the other behind the church of Sta. Maria Maggiore. The former was erected in its present position by Antinori during the reign of Pope Pius VI. about A.D. 1786; and the latter by Fontana, under Sixtus V., about A.D. 1587. Another obelisk, set up A.D. 1789, is at the Trinita de' Monte; another, once on the Spina of the Circus Maximus, was placed, about A.D. 1711, in front of the Pantheon. There is also a small obelisk in the garden of the Villa Mattei, on the Cœlian; and, lastly, a twelfth, of slight interest, was placed by Pius VII. on the Pincian.

France possesses two, one in Paris and another at Arles. The latter is without hieroglyphics, and it appears to have remained where it was landed at Arles for centuries. It was found half buried in the earth in the year 1389, and about three centuries after, a town council reared it upon a pedestal in 1675. The shaft is supported on four lions, and surmounted by a metal sun. That sun was the emblem of Louis XIV., and placed there in honour of the most Christian king. The four sides of the pedestal also contained inscriptions in praise of him, but these were removed by revolutionary ardour. A short time ago only one name remained upon the monument, that of Napoleon III., and at the present moment doubtless there is nothing left to identify it with past events, for it seems that in spite of all their financial success the French still perpetrate the folly of effacing history. Two obelisks, large and small, remain at Constantinople; the larger one, in the At Meidan, Stamboul, is about 50 ft. high, and it is said to have been carried there by the Emperor Theodosius. The extraordinary Indo-Egyptian obelisk at Axum, in Abyssinia, cut out of a single block of granite, is about 60 ft. high. All these obelisks, with the exception, perhaps, of that of Axum, were quarried from the granite rocks of Syené near the First Cataract of the Nile; and originally they all doubtless bore at the apex a further exemplification in metal of the symbol of life or creative power which they represented.

Many well-meaning and spotless people, who will probably inquire of better informed friends about the origin and early use of the obelisk, will be sadly shocked when, from some out-spoken reply, they learn the truth. The obelisks of which the world now takes note are marvellous results of quarrying and cutting; the largest as well, doubtless, as the earliest, are Egyptian.

* See Falkener's "Museum of Classical Antiquities." 1862. Vol. ii., pp. 203-30.
† "Voyage du Luxor en Egypte." Paris, 1835.
‡ L'Obélisque de Louqsor," Paris, 1833. 8vo.

* There is a polygonal obelisk placed on the back of an elephant, which is raised on a lofty pedestal, in front of the Cathedral of Catania, in Sicily.



A RENDEZVOUS OF EGYPTIAN OBELISKS.

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The view represents one of each pair of obelisks at Karnak, near, or rather part of the ruins of Thebes. These obelisks were placed on either side, and in front, of great pyloned entrances. Their dimensions given by various writers are so conflicting that we hardly dare to mention figures. Mr. Fergusson alludes to one at Karnak, set up by Thothmes I., and he says it is 93 ft. 6 in. in height. Mr. Erasmus Wilson cites the authority of M. Mariette, and describes the great obelisk of Karnak as measuring little less than 105 ft. Dr. Birch, in his admirable "Notes upon Obelisks,"* refers to two about 70 ft. long; and to two others rising 90 ft. M. de Verninac St. Maur† makes some observations thereon which may be worth consideration at the present day, although they seem to have been disregarded when the Luxor Obelisk was set up in Paris. He remarked a certain difference between the apex of the Karnak obelisks, particularly that lying prostrate on the ground, and the apex of those of Luxor. In the former the pyramidion is "flush" ("*affleure*") at the bottom with the faces of the monolith, whereas in the latter there is a set-off of some centimètres. This leads to the inference that a gold or bronze capping originally covered the pyramidion at Luxor, and that at Karnac the granite was left bare. That a capping, if not a terminal, was usual, is certain from their inscriptions. One translated by Dr. Birch says, "He has set up an obelisk in his house of basalt, it is capped with black"; in others it is seen that some were "capped with gold" and "inlaid with gold." Some of the obelisks of Thothmes I. are said "to be gilded with pure gold." The use of the set-off remarked by M. de Verninac St. Maur is partly explained by the fact that the obelisks in Rome are capped with metal terminals, for it is not unlikely that the Romans carried with them not only the granite, but also its metallic adjuncts; and that the tradition was preserved by the Italian architects intrusted with their removal or re-erection.

C.—The French Obelisk.

If at all inclined to regard boastfully the carriage of an Egyptian obelisk from Alexandria to London, it may be advisable to remember that more than forty years ago the French not only accomplished an equal task, but they also carried their obelisk from Thebes to Alexandria. A vessel constructed for the purpose was sent from France in March, 1831, under the orders of M. Lebas, an engineer, who in a book of many pages described the whole proceeding. The vessel was taken up the Nile to Thebes, and, after three months' labour, with the aid of eight hundred men, one of the two obelisks in front of the Temple of Luxor was lowered on an inclined plane to the river where the vessel lay. The obelisk arrived safely in the Seine on the 23rd December, 1833, and it was deposited near the Pont de la Concorde. Three years elapsed; and only on the 25th of October, 1836, was it fixed in its present position. This Luxor monolith measures 76 ft. 6 in.; it was placed on the western side of a pyloned entrance to the Temple of Luxor. Ranged between these obelisks and the face of the Temple are or were four seated colossi. The sand had accumulated so as to cover the bases of the monoliths, and some time was spent in clearing the ground around them. M. de Verninac St. Maur has told us of what the bases consisted, and M. Champollion-Figeac‡ pretended that the view of the Luxor obelisk, in its original state, which he published, is the only correct one that had appeared up to that time. According to the former the obelisks rested each upon a single block of granite, and this reposed upon an inferior socle, composed of three pieces of "*grès très-dur placés de champ à coté les uns des autres.*" The height of the two socles together was not more than ten French feet, and an inscription ran all round the lower of the two. M. de Verninac St. Maur took occasion to add that the proportion of this base to the monolith seemed so good at Thebes that it was difficult to understand why the extravagant height it was then proposed to give to the pedestal, and which now exists, should be deemed necessary in France. We confess that the pedestal of the Obelisk in the Place de la Concorde, albeit the work of a man so justly celebrated as the late M. Hittorff, is the least satisfactory part of the splendid square of which it is the centre.

D.—Obelisk at Heliopolis.

Of the three pairs of monoliths which are said to have existed at Heliopolis one alone remains in its place, and this is declared to be the oldest known. It bears the name of Osirtesen. It is almost the sole relic of the ancient Egyptian City of the Sun a few miles north of Cairo, and it is thought to be 5,000 years old. One of the obelisks of Heliopolis now stands in Stamboul, another is in Rome; of the pair vulgarly called Cleopatra's Needles, one, as we said before, is erect in Alexandria, the other is to come to London. Of the fifth, of which little or nothing has been said, we may presume that man has destroyed it, or that the sands have preserved it from his touch. Three obelisks, however, are said to have been conveyed from Heliopolis to Rome.

The Obelisks in Rome.

In our view, E is the celebrated monument placed in front of St. Peter's. The obelisk itself was originally set up by Menephthah, the son of Rameses II., about 1,400 years before Christ. It is difficult to say if the stone be still in its entirety. The shaft is without hieroglyphics; of the Roman obelisks, it is only second in size to that erected by Fontana in front of the St. John Lateran Church. The obelisk at St. Peter's bears an inscription of the time of Caligula, dedicating it to the "god" Augustus, and to the "god" Tiberius. It is said to have been brought from Heliopolis in Egypt to Rome by Caligula, who placed it in the Vatican circus. The labour involved in raising it to its present position, during the reign of Pope Sixtus V., about 1590, was then qualified as miraculous. Fontana accomplished the task only after some five hundred plans were submitted to the Pope by architects and workmen. The obelisk now reposes upon four bronze quadrupeds, squeezed between the monolith and its base.

F,—The Obelisk of the Elephant, and the one from which Bernini, the guest of Louis XIV., obtained his nickname; for it was set up by that architect in the Piazza della Minerva during the reign of Pope Alexander VII., in the year 1667. This obelisk was made at the command of Pharaoh-Hophra, who reigned over Egypt B.C. 588—569, and it is therefore of the time of the burning of Solomon's Temple. Herein we quote Mr. J. H. Parker, not without fear and trembling, for he has given two dates (1660 and 1667), in his few pages about the Roman obelisks, for the second erection of this monolith. The whole monument as it now stands is about 40 ft. high; the shaft is marked with hieroglyphics, and is about 17 ft. long. Probably this elephantine erection* induced Napoleon's aspiration for a similar quadruped on the Place de la Bastille,—a work really designed by Alavoine for the site on which the present graceful column erected by M. Duc now stands. As for the origin of Bernini's idea, it is not difficult to trace a connexion with the stories brought home by travellers, and current in his time, of the "Portuguese Indies." The obelisk is made a little too lofty in our view.

G,—In the Piazza del Popolo, bears the name of Rameses II., and that of his father, Seti. It was brought to Rome by Augustus, and placed on the Spina of the Circus Maximus. It bears the Roman date equivalent to B.C. 10; and it was placed in its present position by Fontana during the reign of Pope Sixtus V., about A.D. 1589.

H,—That in the Piazza di Monte Citorio. According to Mr. Parker it was executed in Egypt by Psammeticus II., B.C. 594—588. It is said to have been brought to Rome by Augustus, and was first set up near the present Church of S. Lorenzo in Lucina to serve as the gnomon or pointer to throw the shadow on the great sun-dial which Augustus is said to have made there. It was placed in its present position during the reign of Pope Pius VI., in 1792.

I,—the Lateran Obelisk, so called because it is placed in the Piazza del Laterano. This it may be presumed is the loftiest in the world; or, at least, that it ranked with its fellow at Heliopolis, and with the celebrated obelisks of Karnak. The shaft is said to be 105 ft. 7 in. long; two sides of it are 9 ft. 8½ in. wide, and the two corresponding sides are 9 ft. It weighs about 445 tons. First brought from Heliopolis to Alexandria by Constantine, it was conveyed by the great Emperor's son, Constantius, to Rome, where it was erected in the Spina of the Circus Maximus. Now broken in three pieces, it was raised to its present position in front of the St. John Lateran Church, by Fontana, under Sixtus V., about A.D. 1588. The monolith is adorned with hieroglyphics. It should have appeared higher in our view. The draughtsman, however, is fully excused by the differences amongst authorities.

J,—Sometimes called the Pamphilian Obelisk, is inscribed with the name of Domitian. Marked with hieroglyphics, it once adorned the Circus of Maxentius. It was placed in its present position, in the Piazza Navona, by Bernini, during the reign of Innocent X., about A.D. 1651. There is a fountain round the base.

Of the twelve Egyptian obelisks in Rome two are believed to have originally formed a pair which were first set up in that city by Augustus, in front of his mausoleum. They are said to have been made about two thousand years before Christ. One is now placed in front of the Quirinal Palace, and the other behind the church of Sta. Maria Maggiore. The former was erected in its present position by Antinori during the reign of Pope Pius VI. about A.D. 1786; and the latter by Fontana, under Sixtus V., about A.D. 1587. Another obelisk, set up A.D. 1789, is at the Trinita de' Monte; another, once on the Spina of the Circus Maximus, was placed, about A.D. 1711, in front of the Pantheon. There is also a small obelisk in the garden of the Villa Mattei, on the Cœlian; and, lastly, a twelfth, of slight interest, was placed by Pius VII. on the Pincian.

France possesses two, one in Paris and another at Arles. The latter is without hieroglyphics, and it appears to have remained where it was landed at Arles for centuries. It was found half buried in the earth in the year 1389, and about three centuries after, a town council reared it upon a pedestal in 1675. The shaft is supported on four lions, and surmounted by a metal sun. That sun was the emblem of Louis XIV., and placed there in honour of the most Christian king. The four sides of the pedestal also contained inscriptions in praise of him, but these were removed by revolutionary ardour. A short time ago only one name remained upon the monument, that of Napoleon III., and at the present moment doubtless there is nothing left to identify it with past events, for it seems that in spite of all their financial success the French still perpetrate the folly of effacing history. Two obelisks, large and small, remain at Constantinople; the larger one, in the At Meidan, Stamboul, is about 50 ft. high, and it is said to have been carried there by the Emperor Theodosius. The extraordinary Indo-Egyptian obelisk at Axum, in Abyssinia, cut out of a single block of granite, is about 60 ft. high. All these obelisks, with the exception, perhaps, of that of Axum, were quarried from the granite rocks of Syené near the First Cataract of the Nile; and originally they all doubtless bore at the apex a further exemplification in metal of the symbol of life or creative power which they represented.

Many well-meaning and spotless people, who will probably inquire of better informed friends about the origin and early use of the obelisk, will be sadly shocked when, from some out-spoken reply, they learn the truth. The obelisks of which the world now takes note are marvellous results of quarrying and cutting; the largest as well, doubtless, as the earliest, are Egyptian.

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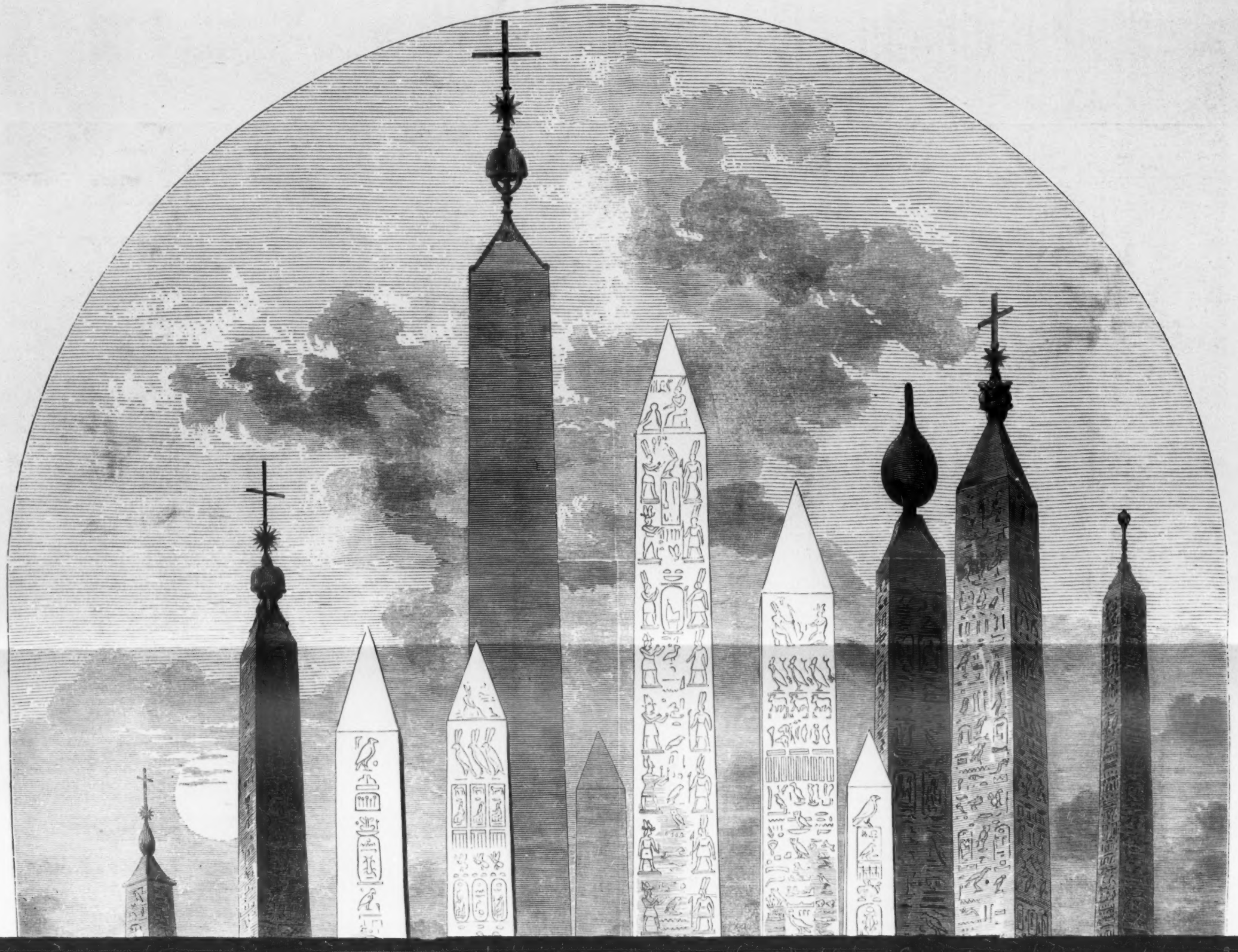
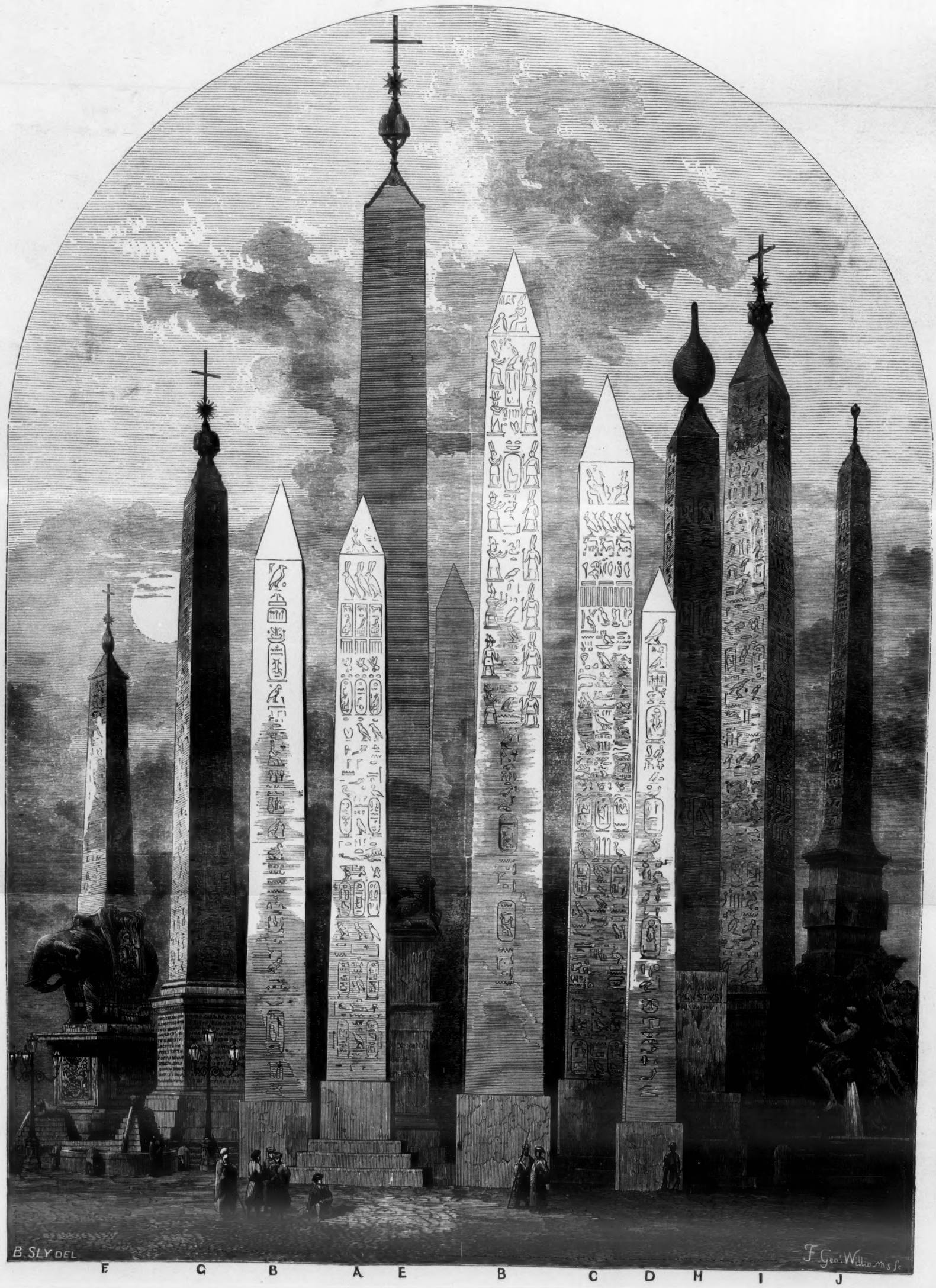
* See Falkener's "Museum of Classical Antiquities," 1862. Vol. II., pp. 203–39.

† "Voyage du Luxor en Egypte." Paris, 1835.

‡ L'Obélisque de Louqsor," Paris, 1833. 8vo.

* There is a polygonal obelisk placed on the back of an elephant, which is raised on a lofty pedestal, in front of the Cathedral of Catania, in Sicily.





A RENDEZVOUS OF EGYPTIAN OBELISKS.

But obelisks are found all over the globe, and the same devotion which caused them to be planted on Egyptian soil in fulfilment of a vow, or with religious intent, still actuates men in parts of India as it actuated them in Europe even as late as the period intervening between the fall of Rome and the rise of Mediæval civilisation. The worship of stocks and stones is even now a phrase not entirely expunged from the English vocabulary; and, as late as the year A.D. 692, a council at Rouen referred to the practice. Various councils in the fifth, sixth, and seventh centuries attempted to put down the veneration which existed of stones in remote and woody places, and where vows were made. At the present day the members of a tribe in India vow a stone to any deceased ancestor to whom prayer is offered; and a certain celebrated *lât* in Benares is still regarded, we believe, by sects of Hindús as the most precious relic of the sacred city. What Siva is to Indian theology Osiris was to that of Egypt; and what the *linga* was and still is to Hindús, the obelisk form was to the Egyptians. We cannot, however, pursue this subject further at present; it may appropriately make another article at a future time. We would only recommend those who are interested therein to read an excellent paper in the Transactions of the Institute of Architects by the late Dr. Barlow ("Symbolism in reference to Art," March 10, 1860); also Mr. Fergusson's "Rude Stone Monuments"; Mr. Sherring's "Sacred City of the Hindús"; and those passages in Herodotus which describe social and religious customs in Egypt almost analogous to many now rife among a vast number of our fellow subjects in India.

OMNIBUSES IN LONDON.

There can be no doubt that our grandchildren will hereafter look back with contemptuous pity upon the manner in which our omnibus traffic is conducted; and the omnibus travelling of the present day, when it comes to be remembered, will certainly not have about it that semi-adventurous kind of attraction which still rests over the coaching days of the past. It will only be thought of as an anachronism existing among modern improvements. We may imagine for a moment some of the criticisms which our descendant will pour out when the present state of things is brought before him. It is true he would find that the London General Omnibus Company pays a dividend at the rate of 12 per cent. per annum; but that would only prove to his mind that the interests of the shareholders are the sole care of the directors, and that the interests of the public are a matter of no concern to a body having the practical monopoly of the omnibus traffic of the metropolis. One of the first points on which the traveller of the future would naturally have a word or two to say, would be the fact that, except at the actual termini, there are no well-known ordinary stopping-places at which the various omnibuses call at stated times. There are, it is true, certain well-known spots where an omnibus is sure to be found halting—such as Oxford-circus, and which from their rareness form a kind of battle-ground for omnibus travellers, all of whom congregrate at the one particular place. Except at these places—few and far between—it is a mere chance where along the route or at what time an omnibus stops or may be found. One consequence of this is, as regards the street traffic, that omnibuses continually stop suddenly amid a throng of carriages, so that the people who are driving find the pole of the carriage immediately behind them appearing over their heads, and the temper of their own horses upset, all in consequence of an omnibus which stops the way. Nothing would be easier than for certain places to be fixed on as recognised omnibus stations, at which the omnibus on the various lines should stop at fixed times, so that people might always be able to catch a particular omnibus just as they may a particular train. People would also know where to expect passengers to alight, and where they might be likely to get a seat without a chase through the mud, or without wandering along a great part of the route in the hope of an omnibus appearing. If these stations were fixed at moderate intervals, they would not only be a great boon to passengers, but would also relieve the street traffic by preventing unexpected stoppings of omnibuses, and would also enable omnibuses to keep something like recognised times. Such places exist in Continental towns, and there is no reason (except the stupidity of the omnibus managers) why they should not also be found in England. If such a system were in vogue, it might also be possible to erect some kind of waiting-room or shelter for passengers, so that passers-by at frequented spots,—such as Piccadilly-circus,—would not have to fight their way through a block of expectant omnibus travellers. And, as far as the latter were concerned, it would prevent many illnesses caused by standing out in a drenching rain, or in a bitter March wind. Benevolent persons have provided hardy cabmen with shelters, and omnibus travellers may fairly expect their turn to come next. Our descendant will no doubt also inquiringly ask, why it is impossible to get tickets either for the single or return journey, or for several single journeys, at shops along the route; and why the dweller in Kensington cannot, if he pleases, obtain a contract-ticket to the Bank for the omnibuses just as much as for the trains? It would probably be difficult to give him any satisfactory answer to these inquiries, except that the directors consider such conveniences of travel as unnecessary as a decent rug on the floor in the winter instead of a bundle of straw, a portion of which every lady who leaves the vehicle carries with her. It will also be a matter of surprise to our critic that here in London outside travellers, whether old or young, portly or thin, are compelled to risk their lives daily by climbing up and down a small and awkward ladder instead of comfortably and securely walking up and down an easy stair with a handrail, as is the case in most of the Manchester and many of the Liverpool omnibuses. He might also be surprised to hear that whereas in London, when the traffic is the least brisk, the vehicles are so small that they become unendurably crowded, in the provincial towns they are large and roomy, and capable of holding many more passengers than those in use in the metropolis. Finally, he will come to the conclusion that we must be a very stupid set of people to let things continue to be so badly conducted as they are. He will wonder how we can quietly submit to a system under which there are no stations, no times kept, no tickets issued,—under which, too, it is impossible at any little distance to tell the route of the omnibus, except by the colour which it is painted. It will be a continual source of astonishment to him that at night-time a person's life may be several times risked in a crowded thoroughfare by endeavouring, often vainly, to ascertain in the darkness the destination of the passing omnibuses, when it would be above all things easy for each separate line to be distinguished by some kind of proper, distinct, and clearly visible light. He would think people very singular in days of co-operation and union not to unite together to obtain reforms in the omnibus traffic, every one of which each of the public is constantly wishing for. Leaving our descendant, however, to wonder, it is quite clear that the present system of omnibus traffic in the metropolis needs many improvements in order to bring it up to anything like the standard of comfort and punctuality attained by the train service of London. It may be doubted, however, whether without a real breakdown of the monopoly of the present company any of these needed improvements will take place, unless, indeed, some legislator, with good sense enough to leave universal arbitration or woman suffrage to the next generation, and desirous of benefiting his fellow citizens by practical and modest means, will endeavour to obtain legislative measures to regulate the management of the omnibus traffic of the city.

Babylonian Discoveries.—A series of relics of the early Babylonian Empire have arrived at the British Museum. They were found on the site of the ancient city of Zergul, which is now marked by the modern village of Zira, on the River Hye, in Babylonia. Their discovery is due to the excavations of Arabs working in the employ of a Jewish dealer in antiquities at Bagdad, the same person from whom the late Mr. George Smith obtained his last collection of tablets. The largest of these objects is a black basalt torso of a figure of large size, bearing the bi-lingual inscription of a king who reigned in the seventeenth century before the Christian era. This monarch bears the name of Hammurabi, and the inscription is of great philological importance, as it furnishes many new words and phrases. Along with this torso are a large number of bricks and cones, bearing inscriptions of various early monarchs.

SCIENCE OF HANDRAILING.

Sir,—Some years ago you published some extracts from Riddell's first work on handrailing, and commented favourably thereon. I looked through those extracts, but failed to find anything to admire. I recently looked through his more pretentious work, and found myself equally unsuccessful, even though he claims to be the first to reduce handrailing to the condition of an exact science. I did find a confusion of parts that must be very puzzling to a student. I also found that what he gives as a complete system is little more than an amplification of the simple cases given by Weston and Perry in a work published in London in 1856; that he distorts his stairs in order to partially fit his craze for keeping the central line of wreath in the centre of the plank; that his method is wholly inapplicable to a wreath of uniform pitch, or any wreath the central line of which cannot be made to lie wholly in a plane; that the only bevels he gives are next to useless in the cases to which his method is properly applicable; that, even in simplicity, he is inferior to Weston; that, in some very important particulars, he is inferior to Perry, Jacy, and Nicholson; and that, in general carpentry and joinery, he is infinitely inferior to the last. By the method employed by Riddell, which, though he claims it as his own, I claim as Weston's, it is easy to make a very beautiful job of a wreath of moderate pitch; but by the methods of Nicholson, Jacy, and Perry, it is possible to make an excellent job of a wreath of any pitch, if the errors inherent in the cylindric system be judiciously modified,—they cannot be wholly corrected.

My estimate of Riddell is, that he is no more a fully-finished handrailer than a smart arithmetician is a fully-accomplished mathematician. He has already done a great deal to eliminate all really artistic jobs; and he has only to make another step in the same direction, to declare that all rails should be straight, so that there might be no difficulty in their construction, and no training necessary for the constructors. Some of the earlier authors gave methods for finding the mutual inclination of the joint and plank-planes, when they do not happen to make right angles with each other: Riddell failed to do this, and he is therefore inferior to them in this respect. If Riddell were required to get a single wreath-piece to cover a whole quadrant and part of the two adjacent flyers, and still adhere to his notion of keeping the centre of the wreath in the centre of the plank, he would simply have to declare the job impossible, and he would be quite right,—for such a job is impossible. But, eliminating the one condition of coincidence of centres, the job is possible, and I have repeatedly accomplished it. I give an illustration of the deviation of centres further on; but I will not, in this paper, go fully into the matter. Riddell's assertion that the wreath may always be got out of stuff whose thickness does not exceed the breadth of the rail, is only an assertion copied from the older authors, and is not at all reliable; for, though, if the centre of rail be always kept in the centre of plank, the thickness of stuff need never exceed the length of the longest line that can be drawn within the section of the finished rail; yet, in case of deviation of centres, the necessary thickness of stuff may even exceed the diagonal of the section of the square rail. Riddell intimates that he has completely solved the grand problem; but he makes no mention of a system whereby a wreath may be formed, every right section of which shall be as truly rectangular as that of the straight rail itself, and therefore capable of being as truly moulded.

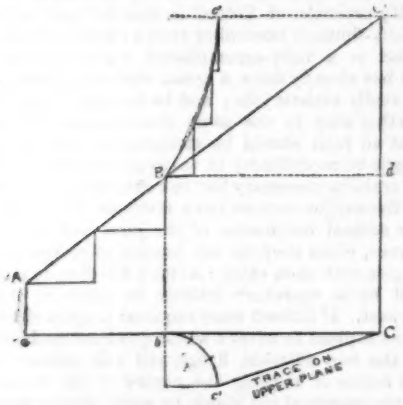
I believe Tarbuck is the only author that ever alluded to such a system. He mentions that it is very desirable that one should be discovered whereby the right sections of the squared wreath might be rectangular, like those of the straight rail, so as to obviate the concavity of one side and convexity of the other, and secure equality in the thickness of the sides. He noticed, and desired to correct, a defect in the cylindric system, which must now be well known to all accomplished handrailers, viz., that, whenever the system is rigorously adhered to, the concave side of the wreath must be thinner than the convex. I may add: the difference of thickness varies with the pitch; and the steeper the pitch the greater the difference,—and in very steep wreaths it is very great indeed.

I have discovered, investigated, and once practised the system desired by Tarbuck; and, though it requires more lines and a more profound knowledge of geometry than any other

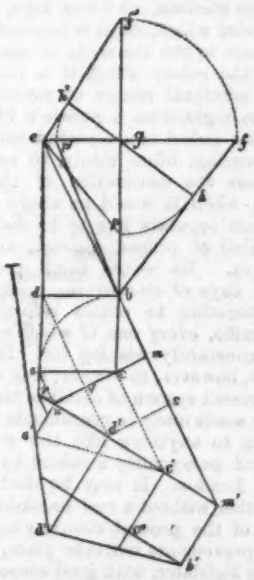
system, it makes the manual work easier and the result more satisfactory. According to this system, all four faces of the squared wreath are twisted: there is no such thing as a vertical side over the circular part of the plan, and the wreath will never fit any cylinder until it is moulded. Though this system is probably the most perfect that can be proposed, it still has its defects,—it is not easily adapted to steep wreaths, and, when the wreath is steep, it throws the baluster slightly forward. I attach to this paper a tracing of the pair of face-moulds with which I used to carry my system into practice at St. Patrick's Hall, in this city, and which appeared in the *Australian Mechanic* in 1872, just to show that they are entirely different from all the face-moulds hitherto made public. I might urge many objections to Riddell's degrading devices for getting over what ought to be wreaths constructed on scientific principles; but, until architects clearly define the exact forms that their wreaths should take, and insist on the complete attainment of these forms, I suppose Riddell's method will be more or less practised in cases to which it is not properly applicable.

Riddell seems to make Plate XVI. his principal demonstration; but, as you doubtless have a copy of his work by you, and it would occupy too much space to give his lines and mine for the job therein shown, I will content myself with endeavouring to show you that any job to which his method is properly applicable may be more lucidly explained with very much fewer lines than he employs.

Let *a b c* be the plan of the central line of rail, *a b* being the aggregate breadth of two



flyers, and there being three winders in the quadrant, *b c*; and, let A B *c'* be its elevation. If the central line of straight rail, A B, resting on the nosings, be produced, it will obviously somewhere attain the same height as *c'*; it is equally obvious it will attain this height at C', a point, the plan of which is C, exactly the breadth of three flyers to the right of *b*. *c'* and C' being then of the same height, they must necessarily be in the same horizontal plane, and *c* C, the plan of the straight line drawn between them, must be the horizontal projection of the trace of the inclined plane passing through the points of which *a b* and *c* are the plans, and A B and *c'* the elevations, on the horizontal plane passing through the point of which *c* C is the plan and *c'* C' the elevation: it is, therefore, the trace of the inclined plane on the horizontal plane passing through the upper extremity, *c c'*, of the wreath-piece, and it completely determines the plane that contains the central line of wreath and straight rail. Of course, the trace of the inclined plane on any horizontal plane being found, its trace on any other horizontal plane will be parallel thereto. (Let me remark: neither Riddell nor any other has ever determined, so far as I know, the exact nature of the falling line for this particular kind of wreath: it is a pure parabolic arc.) Having satisfied myself (and the most able geometer cannot controvert me) that *c* C is the horizontal projection of the trace of the inclined plane on the upper horizontal plane, I find the lines for this particular, simple kind of wreath, as follows:—I lay down the plan, *a b*, of the central line of the wreath-piece, and enclose it in the tangents and radii of its extremities, *a d*, *d b*, *a c*, and *b c*. I produce *a d*, and make *a e* equal to the breadth of as many flyers as there are winders to be covered by the wreath-piece. I draw *e b*, which is the horizontal projection of the trace of the inclined plane on the horizontal plane passing through the highest point of the central line, and produce it indefinitely downwards, and I draw *m n* perpendicular to it. I make *m m'* equal to the height of all the risers to be covered by the wreath-piece, and draw *c c'*, *d d'*, and *a n* parallel with *m m'*. I draw *m' n*, and I then have a right section of the inclined plane. I draw *m' b'*, *d'' d'*, and *n a'*, all perpendicular to *m' n*, and make them respectively equal to *m b*, *v d*, and *n a*. I draw *b' a'*, and I then have the tangent to the highest element of the central line in the wreath-piece. I draw *a' a*, producing it indefinitely, and I then have the tangent to the lowest element in the central line of wreath; this line is, moreover, common to the inclined plane (or the centre of the plank) and the centre of the straight rail, and may, consequently, be made of any desired length. The tangents and the limiting elements of the wreath-line being absolutely coincident, a line, or plane perpendicular to one, must of necessity be perpendicular to the other. I, therefore, draw the joint-lines perpendicular to the tangents. I draw the springing-line, *a' c'*, the semi-conjugate, *c' c''*, and determine the semi-transverse, *r c'*, and, as I require no bevels, I have all the lines I require. I almost invariably make my drawings to a small scale on a sheet of paper, and calculate the lengths of my lines. When I think it necessary, I calculate the angles. I then draw the axes, tangents, and joint-lines to their true lengths on the board from which I intend to cut the face-mould, and put in the curves with the trammel. I never trust the string; for, though true in theory, it is unreliable in practice, on account of its extensibility. On the mould, I draw the longest line I can parallel with the transverse, to use as a shift-line, and my mould is completely described. The stuff being cut out square to the outline of the face-mould, I plane it to a parallel thickness and make the joints perfectly square. I apply the mould again, shifting in the old reliable manner by the line parallel with the transverse, and transfer the tangents drawn thereon to the stuff; I then draw lines in the joints to connect the tangents drawn on the opposite faces, and I have the lines in which vertical planes standing on the tangents to the



plan would cut the solid in position,—thus making bevels wholly unnecessary. Lines perpendicular to these will be level lines in the joints. If I desire to use bevels, which I sometimes do as a check on the lines drawn in the joints, I generally find them outside of the essential drawing, thus:—I produce *c b* indefinitely, and from *e* I draw an indefinite line parallel with *d b*; I make the exterior segments, *g f*, *g f'*, each equal to *s m*, which is what the inclined plane rises from *e* to *g*, or *b* to *g*. I draw *b f*, and *g h* perpendicular thereto; make *g p* equal to *g h*; draw *e p*, and *g p e* is the bevel for the lower joint. I draw *e f'*, and *g h'* perpendicular thereto; make *g p* equal to *g h'*; draw *p b*, and *g p b* is the bevel for the upper joint. The lines *e f'* and *b f* are the traces of the inclined plane on the vertical planes standing on *e g* and *b g* respectively, and there can be little difficulty in seeing the truth of the construction. Though this method makes an excellent job of some wreaths, there are many to which it is wholly inapplicable. If the wreath be steep, it either pushes the soffit-line of the string towards the back of the well, or else it approaches too close to the nosing-line near the springing. If it be necessary that the wreath should be of uniform pitch, it will not do; for in this case the falling-line would be straight in development, and in position no plane can possibly coincide with it; and if it be desired that one wreath-piece should cover a whole quadrant, and part of the two adjacent flyers, the falling-line in position will be still further from coinciding with any possible plane. Even the method for making the joints would not do; for these, to be right, must be perpendicular to the joint element of the falling-line.

The nearest approach made by previous writers on handrailing to finding the best plane for a wreath-piece, is to pass the plane through the two extremities and an intermediate point. I have gone nearer by passing the plane through the central point and two points within the extremities, the latter selected so that the elevation of the central line will twice deviate by equal distances on each side of the right section of the plane, and no nearer approach can be made.

The subjoined diagram is a tracing of the face-moulds which I used for my own twist-cut wreath; and, as I before stated, these face-moulds give the right sections of the squared

wreath truly rectangular. These moulds are not sections of cylinders, but the traces on two parallel planes of lines moving so as to be always perpendicular to the twisted surface passing through the centre of the wreath.

P. Sinclair, Carpenter.

Carlton, Melbourne.

SPANISH CHESTNUT.

Sir,—On June 2nd I asked in your columns for information from any who might "certainly know" of the use of chestnut in Mediæval carpentry, and you printed two replies, neither of which, however, fulfilled this condition of certain knowledge. Mr. Hems referred me to the newspaper paragraph, then current, to the effect that the recently destroyed roof of Metz Cathedral had been of chestnut,—an assertion that has probably been made, at some time, of every large building in Christendom. Your other correspondent, Mr. Roberts, is in error in supposing that the microscope is the only effective test of the difference between oak and chestnut, the leading distinction between them being not only visible to the naked eye, but remarkably conspicuous. Mr. G. Wells, who is clerk of works at Shelswell Park, Oxon, has enabled me to see specimens of chestnuts used, intermixed with oak, in the roof and floors of old Shelswell House, erected about 200 years since, and although this is not of Mediæval date, it is of considerable interest as an old example. The timber seems to have stood fairly well (if it is, as he thinks, part of the original construction); it is decayed in places as any other timber might be if exposed to damp, and it is perfectly sound in other places, which might be expected of any ordinary wood that had been kept in a dry stall. Mr. Wells, who is practically acquainted with chestnut timber, says that if oak and chestnut are placed together it is not possible to make a mistake, and the truth of this will appear from a short description of the main point of distinction between them.

Neglecting minor matters, there is one great distinction,—the medullary rays which shoot out from the pith towards the bark of all woods are usually so indistinct as to require a microscope to detect them; though in a few kinds, as in beech, yellow pine, and laburnum, they can be clearly seen when the tree is cut across. But there is only one kind of wood used in building in which these rays are at all conspicuous, and that wood is oak. The bright, sharp lines of hard substance which we always find in the end grain of oak are sections of the thin plates of medullary rays, which, when the wood is cut down longitudinally through the centre, or nearly so, produce the flower, figure, or pattern which we see in oak or wainscot, and in nothing else. The modes of cutting up oak (which we call "quartering" it), so as to show this pattern on the face of the boards, are well illustrated in Viollet-le-Duc's Dictionary, article "Menuiserie," vol. vi., p. 346.

Now the Spanish chestnut is not even one of

those woods in which the medullary rays are faintly visible to the naked eye; thus a ready and sufficient means of discriminating between it and oak exists. For minor differences we have such as these:—Chestnut is very perceptibly lighter than oak,—softer, straighter in the grain; its annual rings of growth are larger; it has exceedingly little sap-wood, say, about three of its outer rings, which is less than exists in any timber that I know.

Having for many years endeavoured, without success, to find a genuine instance of the Mediæval use of chestnut in carpentry, I feel almost justified in concluding that all the cases in which its occurrence is asserted are unable to bear the test of strict examination. I am, however, aware that a few persons of experience are of opinion that they have found it, and they may be right. It would be of use if persons who take an interest in the question could get a specimen of chestnut wood from some reliable source, and study it for themselves. I should be glad to show to any one calling at my office (10, Old Jewry-chambers), a series of specimens of oak and chestnut obtained from many quarters, and, as attempts are now being made to sell chestnut as oak, and to use it in situations where nothing but oak will stand, it is worth while to be able to distinguish between the two.

I may add that your volume for 1858 (pp. 496 and 528) contains an excellent paper on this subject, read by Mr. Wyatt Papworth at the Institute of Architects. THOS. BLASHILL.

EXETER CATHEDRAL.

THE re-opening services at Exeter Cathedral, upon the completion of the restorations, commenced on the 18th inst. The work has been in progress for seven years, under the direction of Sir Gilbert Scott. Choir, nave, transepts, aisles, chapels, have all been cleansed, and their ancient beauties uncovered or restored. Outside, unfortunate excrescences have been swept away from their unpleasant contiguity, so as to afford an unrestricted view of the grand old pile from all directions. The noble west front, with its multitudinous sculptures of saints and martyrs, has alone been untouched. All this work has involved an expenditure of nearly 50,000*l.*, of which about 3,000*l.* remain to be contributed. The actual amount expended by the dean and chapter is something like 35,000*l.*, and the balance is made up by the costly gifts of special parts of the work which have been undertaken by several persons. The chapter fund amounts in all to about 21,000*l.*

The work was commenced in the spring of 1871, when Mr. Luscombe was appointed to carry out the builder's contract. At this time contracts were signed for the work in the choir, side-chapels, and aisles, to the amount of 6,000*l.*, in the lady-chapel and ambulatory to the amount of 3,000*l.*, and with Messrs. Farmer & Brindley for the woodwork of the stalls, another 6,000*l.* These contracts absorbed 15,000*l.*, and it was then seen that at least 20,000*l.* would have to be spent on this part of the cathedral, independent of the offers to defray the cost of special portions of the work, which began to come in. Operations were commenced in the lady-chapel, then carried on in the ambulatory, and last of all commenced in the choir, so as to leave it open for public worship as long as possible. At the end of June the choir was shut off by a wooden screen, erected so as to leave the organ free for use in the nave. The altar and sanctuary fittings were removed and placed in a position in front of the rood-screen, and afterwards all the services were held in the nave till the eastern portions of the cathedral were yielded up by the contractors in their completeness. Although for certain special features of the work the services of London workmen were requisitioned, it was made an express stipulation by the dean and chapter that local artisans should be employed wherever practicable. This arrangement has been carried out loyally and fairly. The architect took the deepest personal interest in the restoration, and had the carving for the new stalls and other wood-work executed in London, in order that he might constantly be able to watch and direct the progress of the delicate and difficult work. While the work in the choir was going on, an interesting correspondence took place between Sir Gilbert Scott and Archdeacon Freeman, in regard to the screen. The Archdeacon was of opinion that the screen was an imitation work, while the architect contended that it must be the original work either of Bishop Stapeldon in 1325, or of Bishop Grandisson, during the next forty years. As the restoration proceeded, it became known that the original screen must, at any rate, have been considerably disturbed, and was probably reconstructed in the middle of the seventeenth century. The screen was allowed to remain *in situ*, with the organ still in position on it, but the screen itself was pierced so as to provide that view into the choir which was so much desired. The restoration went on satisfactorily until, in the latter part of the year 1873, arose the protracted controversy as to the reredos, which caused much delay.

In effecting the present restoration, attention has been called to the surface wash which seems to have covered the greater part of the building. Its removal has shown most of the sculpture work with greater distinctness, and also certain portions of the stonework of the structure—more especially the groining of the nave, where is noticed the incongruous use of stone of various tints, leading some to the conclusion that at least this portion of the building was intended to be covered by some uniform covering—while again, on the contrary, the careful dressing of the surface, would do away with such an idea. A large quantity of colouring has been exposed, and an interesting series of shields of arms of families in the city and neighbourhood on the interior wall of the south aisle of the nave. This removal of whitewash and restoration of the natural design both as regards pillars, roof, and walls, has been one of the principal parts of the work, both in choir and nave. Many of the beautiful pillars of Purbeck marble were found to be decayed a great deal outside, though the heart was good and sound. The decayed portions have all been renewed, and an idea of how much labour and patience has been involved in this is shown by the fact that over 100 tons of marble were so employed on ten pillars in the choir. The sacrarium is, of course, the most conspicuous object in the choir, by reason of the endeavours that have been made to render it "exceeding magnifical." The reredos, which was erected by Messrs. Farmer & Brindley, at a cost of about 2,000*l.*, is well known to be the gift of Dr. Blackall and Chancellor Harington. As an evidence of the nature of the work which has been done, and of the carefully elaborate manner in which it has been executed, it is mentioned by the *Exeter Gazette* that no fewer than 1,300 new pieces have been placed in the sedilia to make good dilapidated and decayed parts of carvings in this rare and valuable work, which dates from the fourteenth century. The Bishop's throne, erected in 1312, during the time of Bishop Stapeldon, with the beautiful carved work, has been cleansed. Its lofty pinnacled canopy rises to the height of over 50 ft. Notice may be taken of how carefully the new inclosure to the throne, which is fitted to accommodate two chaplains as well as the bishop, has been made to harmonise with the old work, and of the manner in which the portraits have been revived of Bishops Warelwast, Quivil, Stapeldon, and Grandisson, of which traces were discovered at the four corners. In the construction of the choir-stalls, Messrs. Farmer & Brindley have been able to approach closely to the old work in the "misereres," or seats, which in the chief stalls have been left intact. There are forty-nine stalls now, inclusive of the four at the end devoted to the dean, precentor, chancellor, and treasurer, which are respectively surmounted by the figures, in carved oak, of Bishops Marshall, Quivil, Stapeldon, and Grandisson. The whole of the stalls are of the finest, closest-grained oak, canopied and pinnacled, and richly and elaborately carved with foliage and figures of animals and men. The seats of the archdeacons are placed in the posts of honour next to the other dignitaries; the priest-vicars are placed in the centre, and the mayor and corporation on the north side. Choir-stalls, furnished with handsome book-rests of brass, and stalls for the families of the cathedral clergy, are in front of the principal stalls. The brass eagle lectern, and the handsome carved footstool (presented by Chancellor Harington) form no unfitting companions to the beautiful alabaster and marble pulpit, which, at a great cost, was presented for the choir by Mr. Edwin Force, the chapter clerk. From the transepts to the throne the floor is laid with Godwin's tiles, Sicilian marble, and Pocombe stone; from the throne to the sanctuary steps Devonshire marble, Pocombe stone, and tiles are used, the tiles bearing on them the arms of Bishops Warelwast, Marshall, Bruere, Bronescombe, Quivil, Bitton, Stapeldon, Grandisson, and Oldham. The sanctuary steps are of Plymouth marble, and the remainder of the floor up to the altar-rails maintains the character of increasing richness as the altar is approached, being composed of Godwin's tiles, Plymouth, Anglesea, Genoa, and Sicilian marble, and Cornish porphyry, designed in twelve ornamental panels. The remainder of the floor approaching the altar is of specially designed Godwin's tiles, arranged in eight panels, representing prophets and evangelists. The reredos is at either side flanked with wing-walls of polished marble, surmounted by a light iron grille, richly gilded, and about 4 ft. in height. At the time the restoration was commenced in the choir, one of the main objects avowed was to give more room for the worshippers, who at morning service were restricted in the choir. It was hoped that at least 300 additional seats would be gained by removing the unsightly brick screens at the back of the stalls, and throwing open the choir aisles, so that persons sitting there could take some part in the worship in the choir.

In the chapels the work of restoration has been carried on as thoroughly as anywhere in the cathedral. Roofs have been re-coloured, pinnacles and delicate carvings of screens replaced where dilapidated, or otherwise injured, stonework and carvings alike cleaned and restored to their natural tint and form. The lady-chapel, now one of the glories of the cathedral, had been, up till nearly forty years ago, used as the cathedral library. The handsome screen has been restored, and access is gained through gates of polished brass. Devonshire marble and encaustic tiles form the floor. The magnificent east window, perhaps the best in the cathedral, is the gift of Chancellor Harington, and has been executed by Messrs. Clayton & Bell, of London, who have also painted the reredos beneath it. The principal subjects in the window are Our Lord enthroned in glory as the King of the World, with figures grouped around Him, representing the Blessed Virgin, St. Joseph, the Archangel Gabriel, St. John, Joseph of Arimathea, and St. Mary Magdalene. The smaller lights of the window are also filled with subjects connected with the life of Our Saviour on earth, such as the Annunciation, Nativity, Crucifixion, the Women at the Tomb, &c. The new east window in St. Gabriel's Chapel is in memory of the late Archdeacon Freeman. This window is elaborately worked out in rich designs. The tracery is filled with the monograms of SS. Matthew, Mark, Luke, and John, and with figures of angels. The principal lights depict such subjects as the appearance of the Angel to Zacharias, St. Gabriel, the Annunciation, the Maries at the Tomb, St. John at Patmos. There is one other coloured window in this chapel, which has been completed by Mr. Drake, of Exeter, filled with the glass taken out of the first-named, and re-arranged in pattern.

In the transepts, which since the piercing of the screen have been used for congregational purposes, by worshippers unable for lack of space to obtain admission to the choir, in addition to the ordinary work of reparation and cleansing, and the decoration of the bosses underneath the towers, in harmony with the roof of the choir, several special works have been carried out. The Chapel of St. John the Baptist, in the south transept, has been fitted up as a vestry for the priest-vicars, and St. Paul's Chapel, in the north transept, as a vestry for the vicars-choral. The Sylkes chantry in the north transept has also undergone restoration. Other useful improvements in the transepts comprise a new chiming apparatus, which was ingeniously constructed under the direction of Mr. Edwin Luscombe. But the most important work to the transepts is probably the window to the memory of the late Sir John Taylor Coleridge, which has been placed in the south transept by Messrs. Clayton & Bell.

The nave itself, though a very large area, has necessarily fewer special features than the choir, and consequently the work in it has chiefly been confined to cleansing and renovating the pillars, roofs, walls, carvings, mouldings, &c., and endeavouring to restore it to the condition which it formerly occupied as the splendid body of an architectural design (of which the choir is the head) of singular beauty and completeness. There being less work in the nave, or work of a less expensive character, the sum expended has been much less than that on the choir, viz., a little under 10,000*l.* The removal of the yellow wash from the walls has brought to light several interesting traces of ancient decorations. On

the west wall, at each side of the great door, extensive fresco remains are to be seen, but the work is decayed, and the subjects undistinguishable. Mr. R. Dymond, F.S.A., has under his attention some heraldic bearings, rather more distinct, which have been found under the windows of the south aisle; and on the wall over the north porch fragments of an elaborate fresco have been brought to light, including one clear and distinct figure of a cherub. More important discoveries were found on the removal of the colour-wash from the walls of this north porch.

The chief feature in the nave is the new pulpit, which was erected by a few friends in memory of Bishop Patteson (Bishop of Melanesia), who lost his life while engaged in his sacred work at the Island of Nukapa, in 1871. The pulpit contains three sculptured panels, exhibiting—first, the Martyrdom of St. Alban, first British martyr; secondly, the Embarkation of St. Boniface, "The Apostle of Germany," whose missionary labours were so successful in that country; and thirdly, in the centre panel, is represented the placing of the body of Bishop Patteson in a canoe by the natives of Nukapu. The pulpit also contains, in the niches between the panels, carved figures of St. Paul, St. John the Baptist, and St. Stephen. With the exception of four Devonshire marble shafts among the clustered columns of the base, the pulpit is erected entirely of yellow Mansfield stone. The sculptures are by Messrs. Farmer & Brindley, but Mr. Luscombe has made and erected the pulpit from the designs of Sir Gilbert Scott.

THE STEPHENSON MEMORIAL HALL, CHESTERFIELD.

The Marquis of Hartington laid the first stone of the Stephenson Memorial Hall, Chesterfield, on the 17th inst. The hall, with its appointments, is expected to cost at least 13,000*l*. The building, which is Gothic in style, will be constructed of brickwork, relieved with stone dressings, and is situated at the junction of Corporation-street and St. Mary's-gate. In general arrangement it is divided into sections,—one, comprising the free library and science and art schools, is termed the "Institute" portion,—being reserved for the use of the Derbyshire Institute of Mining and Mechanical Engineers,—and the other, the public hall with its accessories, the "Public Hall" portion. The entrance to the Institute portion is in Corporation-street, beneath the tower. The ground floor is reached by a short flight of steps, and consists of a reading-room 34 ft. by 26 ft., library 38 ft. by 21 ft., lecture-hall 40 ft. by 33 ft., and two class-rooms. The first floor is devoted to science and art teaching, and consists of a laboratory, elementary art-teaching room, advanced art-teaching rooms, modelling-room, masters' room, store-room for models, and museum. In the basement floor are placed the keeper's rooms, store-room, serving-room, lavatory, and heating-chamber. The principal entrance to the public hall portion is in Corporation-street, a second entrance being provided in Back-lane; access to the gallery being obtained from each. The hall is 68 ft. by 47 ft., and including the gallery, which is continued round three sides, contains seats for 900 people. There are two retiring-rooms to be used as committee-rooms and ante-rooms for the artists, having a special entrance. The hot-water system of heating will be adopted, and thorough ventilation will be obtained by means of shafts from each room, connected with a main shaft, in which a current of air is inducted by the waste heat from the boiler. The architects are Messrs. Smith & Woodhouse, of Manchester.

Windows.—At the Ecclesiastical Art-Exhibition, in conjunction with the Church Congress at Croydon last week, Messrs. S. Belham & Co. exhibited a window executed by them for Sunningwell Church, near Abingdon, Berkshire, from designs by Mr. Seddon, architect, and Mr. Kennedy, artist. This comprised a representation of the Adoration of the Infant Saviour by the Magi, in three compartments in the upper part, and of our Lord bearing the Cross, with St. Ann on the left side and St. Mary on the right. Messrs. Belham also exhibited specimens of mosaic executed in Rust's glass, mosaic and modelled and coloured stoneware from Messrs. Bailey's Potteries of Fulham, and a mantelpiece of their own manufacture, with a panel of mosaic inserted therein.

PROPOSED AMENDMENT OF BUILDING ACT.

At the meeting of Metropolitan Board of Works on the 19th inst., Mr. J. Rantz proposed the following resolution:—"That it be referred to the Works and General Purposes Committee to consider and report what amendments are urgently required in the Metropolitan Building Act, 1855, the Metropolis Management Act, 1855, and the Acts amending the same respectively, with respect to houses and buildings, and especially to report what amendments are desirable with reference to the width of roads, foundations of houses, buildings, and erections, and recovery of expenses relating to dangerous structures, with power to instruct counsel to settle any Bill." The mover said he did not propose to go into the question, but he might state briefly that at the present time there was no law affecting the subject of the foundation of houses, and considerable mischief had resulted in consequence of the proceedings of the builders in digging out the gravel, and building on refuse and rubbish.

Mr. Selway seconded the motion, and after some remarks from Mr. Dresser-Rogers and Mr. Fell, it was put and carried.

MESSRS. REID & CO.'S BREWERY.

This large new building, extending as it does from Gray's-inn-road on the west, to within a few yards of Farringdon-street on the east, is now drawing near its completion. The fixing of the machinery, prodigious vats, and general plant, which is on a scale of great magnitude, has already been disposed of. The builders are Messrs. W. Cubitt & Co., Gray's-inn-road. The whole of the telegraph work, comprising ordinary telegraph communication, complete system of fire-alarms, lightning conductors, tell-tales, registering apparatus, electric bells, and indicating instruments for various purposes, has been placed in the hands of Francis & Co., of the Eagle Telegraph Works. The same firm, we are told, are also engaged in the manufacture of similar arrangements for the New Law Courts.

CONVALESCENT HOME, BELFAST.

The memorial-stone of the convalescent Home on the Throne Lands, Belfast, was laid on the 16th inst. by Sir Richard Wallace. The building, which is completed, occupies a commanding site on the lower escarpment of the Cave-hill, having a full view of the Belfast Lough, County Down Coast, and Carmoney hills. The cost of the entire block of buildings, comprising the convalescent home and children's hospital, amounted to about 14,000*l*. The style is Gothic, and the materials used consist chiefly of red perforated bricks, with black brick string-courses and bands. The dressings are of white sandstone, from the Scrabo quarries, county Down. The building is divided into two departments, that situated on the right being devoted to the children's hospital, and that on the left to the convalescent home. The former branch of the establishment will afford accommodation for thirty-two children, and the latter for upwards of thirty patients. This is the existing accommodation; but it is intended to enlarge the plan, so that upwards of 100 patients in the aggregate will eventually be provided for. Special provision has been made by the architect in planning the building for the accommodation of ten patients of the class who pay for their own attendance. These wards or rooms supply a want which has been long felt in Belfast by the middle class of the community. The entire buildings are spread over an area of about half an acre. The children's wing is about 160 ft. long by 36 ft. in width, and comprises, on the ground-plan, two large dormitories, matron's and nurses' bedrooms, board-room, pantries, water-closets, &c., and the upper, or chamber plan, is principally for dormitory accommodation. The convalescent home, which occupies the left of the block of buildings, is divided into various departments, provision having been made on the ground-floor for a dispensary, surgery, major and minor dormitories, and extensive culinary offices (the latter consisting of kitchen, 30 ft. by 20 ft., pantry, dairy, larder, knife-room, meal-house, store-room, &c.), with basement accommodation underneath, such as fuel and provision stores, &c. A spacious corridor, 240 ft. in length, extends from one end of the block to the other. This corridor is 10 ft. in width, and 18 ft. in height. The works, comprising all the accommodation, excepting the children's hospital, have been carried out from the designs and under the superintendence of Messrs. Thomas Jackson & Son, architects, Belfast. The contractors being Messrs. H. & J. Martin, Mr. James Martin having the personal supervision of the works under the contractors. The children's hospital, which was erected some time since, is from the designs of Mr. T. Hevey, architect.

ARCHITECTURAL DESIGNS IN THE PARIS EXHIBITION, 1878.

A memorandum has been prepared by the Paris Exhibition (1878) Architectural Committee of the Institute of British Architects, for the information of architects who may be desirous of exhibiting drawings, &c., at the forthcoming International Exhibition in Paris. Mr. T. Roger Smith, who acts as honorary secretary, will forward forms of application for space and any further information desired to any architects who may write to him at the rooms of the Institute.

The works of art admissible to the Exhibition are those of French or foreign artists, executed since 1st May, 1867. But H.R.H. the Prince of Wales, president, has obtained the following exception to this rule:—All works executed before the 1st January, 1867, by living artists, or by artists deceased since that date, can be exhibited, subject to the condition of bearing a label with the date of execution and the words "Hors Concours" as being excluded from competition. The works of art mentioned include architectural drawings and models, and restorations based upon existing ruins or documents.

PRIZES GIVEN BY THE MANCHESTER SOCIETY OF ARCHITECTS.

We have received the committee's report on the drawings and sketches submitted by students and assistants in competition for the prizes offered by and through the society. The committee regret that so few students have availed themselves of the opportunities offered by the society. They say, nevertheless:—

"Your committee have examined the different sketches and drawings submitted, and, with a few exceptions, find them executed in a careful and highly creditable manner. Those of the Manchester Cathedral, by John N. Horsfield, are most excellent in all respects; and your committee, while regretting that there was no other competitor, have no hesitation in recommending that the prize be given to him.

The sketches of the Assize Courts submitted by Alexander Bond are not of the character or merit which your committee think the prize warrants, and they hardly feel justified in recommending that it be awarded to him, but, in consideration of his industry and the short time during which he has been under articles, they suggest that a prize of the value of 2*l*. 2*s*. be given to him.

The set of measured drawings of the old Town Hall, Manchester, submitted by Peter Hesketh, are carefully and neatly drawn, and are highly creditable to him on the whole, and the committee consider that he is fairly entitled to the prize."

They award various other prizes in addition.

A LINE OF FRONT DISPUTE.

CLAPHAM.

At the meeting of the Wandsworth District Board of Works, last week, Mr. H. J. Brashier, builder, attended the Board to show cause why a building which he had erected in James-street, Clapham, should not be removed in consequence of his having advanced beyond the general line of frontage. Mr. Brashier produced a photograph which he contended proved that he had not gone beyond the general frontage line, but the chairman intimated that the photograph did nothing of the kind, and an animated dispute between them followed, the chairman observing that the Board was quite aware of the elevation, and that the building had been commenced without the proper notice having been given. He also intimated to Mr. Brashier that the Board required him to take it down, whereupon Mr. Brashier expressed his unwillingness to do so, stating that he had received notice from the freeholder not to remove the building, inasmuch as by doing so he would break a covenant in the lease. The chairman said if he did not remove it the Board would take proceedings. Time would be given for that purpose, and if not then done the Board would demolish it themselves. Mr. Brashier replied that he certainly should not do so, and he warned the Board that if they demolished it, they would do it on their own responsibility and at their own risk.

THE WAR OF CAPITAL AND ANTI-CAPITAL.

AN ANSWER TO SIR EDMUND BECKETT.*

Sir,—If a few facts of the following kind could be known to persons like Sir Edmund Beckett, I venture to think they would not all find the decline of workmanship and of "working will," that so justly alarm him and Carlyle, and all patriotic people, quite so mysterious as he does.

When the late Étienne Leclaire, master house-finisher of Paris, above forty years ago, succeeded to his father's business, employing, I think, some fifty men, he found, exactly like Sir Edmund's "first-rate builder," his continual remonstrances at "acts of gross carelessness" met by the same true and obviously sufficient answer,—they were "not paid for thinking," and perhaps added, as they might, that already they gave him "better than the worst that could be paid for." Hereupon he did not complain to the country, or lecture all workmen on the shabbiness of counting just what is paid for, or not giving society more unstinted alms; but he was equal to the logic of considering whose fault it was if care required was not paid for, and inferring that, if they were to think, they *must* and *should* be paid for thinking, and proportionally to results thereof. So the next step was to devise *how*,—crudely at first, but yearly juster and juster modes of payment by results. Now remonstrances ceased to be needed as soon as the famous answer became unmakeable; his business improved and grew for more than a generation. He died in 1871, employer of about six times as many hands as his father; and if Sir Edmund examines their workmanship he will find no decline of quality at any time.

The secret was that in all this, while growing sixfold richer by the usury of this stock, and constantly gaining, too, more mastery over the hands, Leclaire had soon quite ceased to be a capitalist. Never was he called one, for his stock and gains were reckoned and regulated so differently, nay, oppositely, to all capitalist ways and principles, that I can only call them his anti-capital. The honesty of thought above hinted at is totally incompatible with capitalistry. Capital and workmen have *opposite* interests. Anticapital and workmen have *the same* interest. In other words, a capitalist is one who has chosen to make his interest antihuman. An anticapitalist chooses that his interest shall not be antihuman. Another small difference is that the one chooses open accounts; the other, secret ones. The one accountant works in light; the other, like burglars and nocturnal vermin, in darkness. Yet another contrast; under anticapital all work and "working will" steadily improve, but under capital constantly deteriorate. Nothing is more marvellous or creditable than the slowness of this decline among us, for Sir Edmund admits the possibility, I suppose, at any time he has known, of obtaining, by some trouble or expense, work equal to the average work of several years earlier; which possibility I call the greatest marvel in England.

When the *Times* wrote, and Mr. Potter quoted, that "the masters wish to reduce wages, and thus to increase their own share of the gains, by the amount they withhold from the men"; I beg to remark, the *Times* described the way of none but capitalist masters; or, rather, that the former word alone should have been used. For, after all, are capitalists ever really masters? Who decides what manner of machine or hand-made bricks your capitalists, or Queen, or Parliament shall be able to have? or whether wrought stone may be carried into Manchester? You see (by a hundred such cases) that if capital be "master," it has to give mobs of its most imbruted helotry the place of master's master! Now, Leclaire, by turning his father's capital into anticapital, became, because no capitalist, verily a master. For these two characters in their fulness, you will find to be incompatible, and exclude each other.

My capital (if I owned any) would be value employed in fetching me whatever it could of poorer men's earnings, or, as Locke said (in his "Essay on Interest"), "transferring the profit that is the fruit of one man's labour into another man's pocket." I have nothing knowingly so basely misused, but I have what has to be employed in hindering richer men thus pooketing earnings of mine. Anything, then, perverted in the former way being termed capital, what can I call the latter but anti-capital? If I hold some Government stock, whose dividends do not cover, or do but exactly cover my outgoing rates, ground-rent, and all taxes, direct or indirect, that is all anti-capital; but if I then purchase more stock, so as to derive income beyond those outgoings, I am guilty of capitalism, this latter stock alone being capital. Thus, investments both equally to my profit may socially be so radically opposed that all the use of one is to prevent or undo the other's effects. No capital is really a man's property or tool, but all is the Devil's (of whose existence it is the chief proof),—its devilish nightwork, the juggling away earning from earner to non-earner,—and all anti-capital is employed in hindering such transfer.

But leaving the little-known, though readily-knowable case of Parisian Leclaire, I would refer to a remote, but the largest and most widely told case. In everybody's hands, in the book esteemed your very oldest, and the life-story most told upon earth, we may read in chapter 47 of the richest monopolist on record, not, indeed, biggest specie-holder, but richest in the exact way capitalists desire. Quite unlike Solomon's making "silver to be as stones," this Pharaoh is famine-made sole stockbroker among paupers. Splendid and unlimited opportunity for capitalism! Will he not found the ever so many per cent. Consols, and initiate our glorious "strike and lock-out" system for ever? On the contrary, *his* "miraculous Hebrew Premier" (for he happened to resemble us in such a possession), gets him to do exactly like simpleton Leclaire,—and by a partnership with all the labourers, making his and their interests one, to exclude all possible "quarrels over the division of the joint spoil"; the phrases "division" and "share" being not as now, newspaper juggling words, but actualities. And this so successfully that, says the Genesis writer, professedly six centuries later (when there was a king in Israel, xxxvi. 31) the exact ratio of division subsisted unaltered "unto this day."

That premier's name was "Saviour of Society" (Zaphnath-paaneah), and every user of anti-capital, like him, his king, or Leclaire, is entitled to the holy socialist name, as helping or building human society, which every the best capitalist is actively burning down at all points. But if we are told the legend is unhistoric, does that deprive us of the reason? Your Bible-smashing comes too late. What if Egypt was never, as the story implies, made for a long time too hot for capitalists? Do you think we readers, our millions, can be stopped learning from it, to be fully resolved on seeing England made so by and by? Once there be that whose name is another of your conjuring words, "Popular Representation," that, as Mr. Greg warns you, England has not seen for many a century, and quickly as ever she cleared herself, in turn, of friars, highwaymen, and other broods of night, once swarming enough, she will cease to harbour capitalists. I never heard, till Sir Edmund Beckett told us, of any one classing these "with kings and priests"; but if kings, priests, or baronets like to class themselves in such company,—well, it is their affair. We mean to be shut of capital, and of capital's friends, be they kings or what not. And then, but not sooner, may he see his hoped-for check to the decline of workmanship. For no prophecy was ever truer than this from Chelsea, ten years ago,—"it is certain (though widely unknown) servantship, on the nomadic principle, at the rate of so many shillings per day, cannot be other than misdone."

And no greater mistake probably was ever made than Sir Edmund's, that even the least "frantic" of us may be told any more "with advantage that a capitalist is *only* (!) a man who has not spent all that he ever had." The veriest muddlepates are now rather too old for that oft-repeated (as they call it) "stupendous whopper"; and he cannot but see, on giving it a minute's thought, that no less monstrous than saying a murderer is *only* a man not destitute of weapons, must it to be to ascribe to the mere touch of sixpences power to turn a creature of God into a capitalist! Plenty can hold, he may be sure, thousands of sixpences, without being sunk thereby low enough to make capital of them. Does that which goeth into the mouth (or hand) so defile a man? By no means. Capitalist makes capital, not the reverse. From within, out of the heart, proceeds what can alone turn wealth into "illth," as Ruskin terms it. Can sixpences or aught become capital till fallen into the paw of some creature already inwardly a capitalist?

The same prophecy above quoted says,—"Speech issuing in no deed is hateful and contemptible." I would invite Sir Edmund, then, to join in some humble undermining of the evil. I will do what little I can—undertake to contribute 1,000*l.*, if he, or any number of workmen, all of one trade, will make up other 5,000*l.* to start the first of the joint-stock companies that must get their usury by anti-capital instead of by capital, if England is to live. Our name, imitating the "Saint Georges," may be "*Sinner Pharaoh's Company*, for recovering true workmanship by excluding capitalists." We shall meet with no such registration difficulties as the modern St. George, because ours is to be, unlike his, a strictly trading company for profit; our exemplar not being recorded to have either received or given alms, so that neither will our company.

Whoever may deign to advise on this will please to write out and send me these two engagements:—

"1. I will claim no greater voice in this company's management than proportional to each one's investments, each divided by the number of complete half-years between 1876 and the time of investing.

2. (*The Holy Creed.*)—'Pharaoh's usury was good usury' (Gen. xlvii. 24), with which I will be content; and will get no other gain of the poorer members' labours, on pain of forfeiting all my capital if detected."

We shall be opener than St. George in matter of faith, because as much as is known of Pharaoh's is fixed of ours, and no more; or, rather, as much as can be found in our text-chapter, which, though one of the longest in Genesis, may surprise some by the fact of no more alluding than the strictest Comtist to any greater being than humanity.

Proposed inscription for the obelisk base:—

"*My Master took but a Fifth of their People's Earnings to govern, employ, direct, and defend them.*"

Edwd. L. Garbett.

* We cannot profess to agree with the writer of this in all his opinions, but he has well earned as a thinker a right to be heard, and the offer with which the letter concludes places it on a different footing from some others we have received.

PEERAGE PROPERTY.

Sir,—In former times I have, by your kind permission, called public attention to the "land question," and I therefore feel much interested in the discussion originated on the above subject by Mr. George Mitchell. It cannot be doubted that he is, in the main, right in his argument, although for want of the exact figures he has laid himself open to the strictures of the Messrs. Powell, whose letter, though hostile, is decidedly temperate and unargumentative. To assist in a fair understanding of the matter, in so far at least as Scotland is concerned, I propose to quote a few figures from the "Domesday Book of Scotland,"—a book issued by the Government, and correct probably, in so far as it relates to the land in actual possession, but, like its fellow relating to England, so manifestly wrong in that it classifies all leaseholders of ninety-nine years and upwards as proprietors, although their holdings may be of no greater extent than Mr. Mitchell's family-grave in Brompton Cemetery, or the little plot of land on which he has built his dwelling-house, and which will revert to the ground landlord, house and all, at the end of his lease. The effect of this classification is to add immensely to the numbers of so-called proprietors, and to reduce the acreage of those in the list who have thus let off their land. In no case, therefore, has any person less than the acreage set against his name, but he may, and if his land is partly in towns, will, have considerably more. The figures are as follow:—

The Duke and Duchess of Sutherland	1,336,223	acres
Sir J. and Mr. A. Matheson	626,503	"
Earl of Breadalbane	437,696	"
Duke of Buccleugh	433,183	"
Earl of Seafield	306,000	"
Mr. Evan Baillie	300,000	"
Earl of Stair	270,000	"
Duke of Richmond	256,000	"
Duke of Atholle	194,000	"
Duke of Hamilton	183,000	"
Duke of Argyll	175,000	"
Sir K. Mackenzie of Gairloch	164,680	"
Macleod of Macleod	141,700	"
Earl of Dalhousie	136,000	"
Lord Macdonald	130,000	"
The Mackintosh	124,000	"
Earl of Fife	119,000	"
Sir C. W. Ross	110,400	"
Cameron of Lochiel	109,500	"
Duke of Portland	108,000	"
Sir G. M. Grant	103,000	"
Total	5,743,884	"

With two exceptions, the whole of the persons in the above list belong to the peerage, and deducting the land held by those two, we find that twenty-one men own nearly one-third, and one man and his wife own more than a fifteenth of the whole of the land in Scotland; 106 persons own 9,350,884 acres,—nearly half the extent of Scotland,—not one of whom has less than 20,000 acres, and most of these belong to the peerage. How they became possessed of these enormous properties I am not now too curiously about to inquire, but the frequent recurrence of purely Scotch names would seem to indicate that the right of the chiefs of clans to a part of the produce of the soil had somehow hardened in time to the possession of the soil itself.

The annual value of these immense estates is, as a matter of course, estimated at a very low figure, that of

the Duke of Sutherland being set down at 1s. per acre. Those of us who have had the advantage of seeing his well-known face as he has been wildly careering through the streets of London on a fire-engine, will need no assurance that the Duke is a man of wonderful energy, and this energy he displays in the management of his estates. As much cannot be said of most of the other large proprietors, who are content to get as much out of their life interest as possible; but the Duke's estate is so large that he can no more cultivate it than he can pay the National Debt; and yet he cannot sell it, and the leasing of it is usually on such terms that few can touch it, so that, like the dog in the manger, these proprietors cannot enjoy their estates themselves, and they can and do prevent others. Capitalists will not touch them, because they have no security, and poor men are constantly emigrating to lands where they may find a constant supply of meat, instead of the perennial scarcity of oatmeal they are subject to at home. This condition of things keeps down cultivation and improvement generally. Just fancy what an alteration would soon take place if the law or custom of primogeniture and entail were abolished, and these estates became divided among families of relations who have to be provided for in other ways by a grateful country. If in addition tenures in perpetuity were granted, both for the surface and for minerals, there would grow up rights subordinate to the chief which would change the whole condition of things. Instead of as at present, when a once populous country of hardy, frugal, and warlike people is denuded of its population, and the country given over to the cultivation of the deer (and a most expensive production it has proved to be), we should, under the altered conditions, find that Scotchmen,—whose reluctance to go back to their native land is now proverbial,—would flock back from all parts of the world, and what is now a desert would become more populous than ever. Think of the amount of building of all kinds that would then be required.

The same condition of things obtains in England, but in a less degree, and it behoves every one who has the interest of his country at heart to endeavour to alter it.

E. Grimes.

LABOUR AND WEALTH.

Sir,—Pardon me, I pray, for taking up my pen to criticise the article under this title in your paper of the 13th inst. . . . . The whole of your article quietly assumes that self-interest must be always the most powerful motive among us. Need this be so? A man who has a special power of influencing his fellow-men, who can judge instinctively the cost of work, who can organise and direct, must love to exercise these powers; but may not the service of others, such powers enable us to perform, become, some future day, more pleasant than the service to ourselves we can wring out of them?

I do not wish in my remarks to trespass upon the labours of the Church Congress, but such a changed heart, and consequent new social order, appears, to my lay wisdom, as plainly to be expected, if Christianity be true, as the plant is to be expected from the seed.

You object to the efforts of the wage class to destroy wages, as an effort on their part to "saw off the branch on which they sit." Instead of thus turning to the men and breasting the stream, I would turn to the masters, and urge them to be more considerate of the men than even the men are of themselves, and while still assuring to them the branch on which they sit,—their certain weekly wage,—to add to it a bonus out of extra profit to be earned through extra industry on their part.

There is no novelty in my suggestion, you will say; and I answer, therein lies its chief merit.

"It has been tried and failed," you will say. "And tried and succeeded," I answer.

"Briggs's colliery——!" "Quite true," I say. "At first a great success, afterwards a seemingly conspicuous failure." In this colliery (as we all know) the strikes of many years ago were ended by this very scheme. Under the *régime* which brought peace, the men were paid their wages as before, the interest on the capital employed was then deducted from the profits, and the balance divided between the masters and the men, the men's share being distributed among them in proportion to their wages.

This arrangement was commenced in 1865, and in place of such violent contention between masters and men, that at one time the aid of the police had to be invoked for the protection of the masters' lives and property, it produced a peace and prosperity so great that speaking of it in 1867, Messrs. Briggs say (Parliamentary Report, p. 109), "the adoption of these principles of industrial co-operation has changed the relation of employer and employed from a condition of mutual strife and antagonism to one of harmony and goodwill"; and again (p. 115), "a larger profit has been realised by the partners in the year gone by than during any previous year."

Here was grand success, followed by failure. But for what reason failure? I have no printed record of the failure before me, as I have of the success, but success painted in such glowing language as in the report in my hand does give a colour to the tale related to me of the cause of failure. The arrangement broke down, I am told, because, during the recent prosperous years of coal-mining, the profits, which would, by the arrangement, have been divided among the men, were so large, that their share of profits was reduced.

The reduced amount distributed was a great amount, and the men did not grumble at the time (thus runs my information); but they noted the change. The inflated price of coal fell, and with the fall came a desire on the part of the masters to reduce the wages. "No!" said the men, "in prosperous times you docked our profits, in bad times you shall not dock our wages"; and hence the break up of the arrangements.

I repeat in this what I am told; with the accuracy or inaccuracy of my information, I do not, however, regard myself as largely concerned. It is clear to my own reason that the union of men against masters must be met by union between masters and men,—that the seeming interest of the men in reducing the amount of work the day's labour produces, must be met by a conspicuous interest on the part of each to increase that amount,—it is so clear to me that this must be done without interfering with the law which brings the strong man to the top, that I cannot but think the next social step in which real progress is made must result in a wide infusion into all employments of such a principle as that embodied in Briggs & Co. in their days of bonus-giving.

The habit of unaudited management in business may be hard to part with, that of openness and even dealing with the employed still harder to acquire, but a willing co-operation between employer and employed were surely worth more than acquirements even of such great difficulty. Why should not a builder, on taking a contract, say to his men,—"I reckon to make such a profit on this contract in payment for my capital, labour, plant, and risk; if I make more than this, I will share the difference with you, and distribute your share among you in proportion to the gross wages I have paid each of you on the contract work. It lies with you to secure this extra profit by your own energy and industry."

And if a builder may thus deal with a contract, any employer may plainly deal similarly with any work which is capable of being divided into "piece-work." Such arrangements as this, moreover, can hardly damage the master pecuniarily. They may not operate largely at first in producing any extra profit, but if the master is not too grasping in determining his own share they will produce some; and the men, once assured by experience, the effect will grow, and the profits to both masters and men increase.

So matters appear to me; and when, with wonder that others cannot widely see as I see, I look round, I observe that besides succeeding temporarily with Briggs, the arrangements I have set forth have succeeded in many other cases often publicly described. Privately also, in professional forms, I have known the same arrangements adopted, and an energy, elasticity, and general interest thrown thereby into office work, producing in it a life and spirit beside which the profit, also undoubtedly realised, sinks into insignificance.

Such are the facts, and yet how sadly is such a failure as that of Briggs allowed to hide its success, how universally are all these promising possibilities of peace and prosperity ignored! Surely, I must think the love of an unchecked dominion blinds men's eyes to that cure for disputes and differences between masters and men which lies at our hands, and in recommending which appeal can be made, not to theory alone, but also to much brilliant success.

Horace Field.

With reference to the subject matter of "Labour and Wealth" I wish to point out that it is now becoming a very expensive process to control the *wills* of educated men. I put it thus as a postulate, well knowing, however, that the same idea might be expressed in many different ways, but this seems to me the most effective way of putting it.

Education is a general term; we need not confine its meaning and application to that mental culture which is founded in the proverbial three R's, for there is the political education furnished by newspaper reading; an education which creates a mind and contracts while it creates: acting psychically as, physically, the flat-heads contract their skulls.

The schoolmaster is now abroad, and he does not preach submission; public prints must conciliate their supporters, and all do it more or less by flattering their readers' vanity: this takes the form of appeals to their judgment; each appeal serves by inflation to raise the suitor at a bound from floor to bench, the desire to judge is aroused, and the power to judge is taken for granted.

The real difficulty of controlling an educated man results from his progressive power. Sheep are the very stupidest things known, yet see how readily they follow one another through a hedge; this unanimity is no result of organisation. Such birds, insects, and animals as have a power of organisation do act in concert, but it cannot be shown that they agree by submission: take the bee, for instance; why, their queen is a prisoner! The bee has an instinctive capacity for secreting honey, but man is not a money spinner in the same instinctive way that the bee is a producer of honey; man has a producing power, and by it the wealth of nations is progressively advancing, but he has also an innate *will*, the exercise of which is with many people a stronger faculty than the desire to produce; and the will, thus exercised, too frequently becomes hostile to production. There is further, among men, an innate desire for each class to exalt itself at the expense of all other classes. We know, for instance, the jealousy for precedence that exists between army and navy, between the faculty of law and medicine, between clergy and laity; the scientist aspires to surpass all these, and a certain fifth estate sets itself above even the Lords and Commons. Truly it is an expensive thing to control the wills of educated men.

Now, this jealousy really has its rise in the idea of self-advancement, and it is self-advancement that prompts the action of these trade unions,—perhaps mistakably as an ultimate result, but with a temporary advantage: like besiegers who work by sap and mine, they may blow themselves up in the end, or be repulsed; but there is progress. The schoolmaster is abroad, the artisan is educated, and right or wrong he means to test his power of advancement as against *all* other classes. The result may work somewhat thus:—

I. The ultimate beneficiaries under the proposed system will, in the majority of cases, be of the lowest orders.

II. The individuals so benefited will jump more rapidly to the front rank in social life.

III. The seething of competition so generated must prevent centres of industry from remaining stationary; trades will necessarily shift from country to country, from people to people, according to the exigencies of the labour market.

IV. Such combinations of workmen to benefit themselves by labour unions is better than a combination of socialists to equalise property by force: the workmen, as bees, are still producers; socialists are the wasps of society.

V. The fortunate workmen who thus rise would become the aristocracy of future generations.

We have seen an aristocracy of mailed robbers, an aristocracy of landed proprietors, an aristocracy of commerce, or moneycracy, as it has been contemptuously called; may we ever see an aristocracy of labour?

This result is not what the agitators promise, but it is a more likely result than the aristocracy of intellect which some people dream of: labour fills the pocket, whether it be the labour o artist or of artisan. The expression, aristocracy of talent, implies a body of men instinctively desirous of leading, and utterly unacquainted with submission. The *dignity* of labour is a mere windy expression if the labour be unsupported by income; give the income, and the motive for labour is taken away.

I cannot doubt that the operation of trade unions has injured some trades in England, but the agitators will not stick at that, for they work towards an ideal. And there are gain and progress towards the end they have in view; that is to say, they do thereby raise the working man in the scale of social life. Many artisans now rank above small shopkeepers; the next step would thrust them among the so-called middle class, and then——? Looked at from the employers' point of view, capital seeks to control labour; reverse the picture, and we find that labour is seeking a way to control capital. In the present day it is hopeless to put down trade unions by law. What we have to do is to control their action within proper limits. Rattening requires a special legislation. Picketing can be defined and restricted. Certain extreme combinations can be

stigmatised as conspiracy, and prosecuted accordingly. Let us show that we can be "cunning of fence," and the *Sir Tobys* will draw off.

VENDALE

ROYAL DUBLIN SOCIETY, AND LEINSTER LAWN.

SIR,—I have to ask your assistance (always given in a good cause) to defeat a project which has just been made public, and which must be stamped out at once and for ever. It is proposed by certain officials of South Kensington to build up the open air-space now left between the ends of the National Gallery and the Museum, thus closing up the splendid frontage of Leinster House, and one of the most effective city views which we possess, spoiling for ever the handsome well-kept lawn where the only ornamental gardening attempted in Dublin may be seen by all. The space is small, but it is a jem, well set in glorious colours, a "thing of beauty." And the flowers and the sunshine of the "lawn" will do more to humanise, to refine, to educate, to strengthen the sick, to cheer the weary, than all the glass cases, galleries, and specimens we may be promised in the far-off time to come.

There is a statue of the Prince Consort, by Foley, in the centre of the present lawn, duly unveiled by royalty. We are promised a peep at this, if we are good boys, through a "large archway" in the future building. Paddy will say they have obstructed Albert the Good, and put him in a dungeon. It will be, indeed, a prison-yard, shut out from sun and breeze, surrounded on all sides by lofty buildings. Only 440 ft. now in length, it will be reduced to a little square of 250 ft. or so, and the idea of flowers blooming in such an enclosed plot is absurd.

As a life member of the Royal Dublin Society, I should regret to see our beautiful lawn,—trim, neat, and tasteful,—crushed up with buildings of the "Brick-boiler-terra-cotta-style" now so vaunted, even with the addition of a "large archway," and a cabman's stand inside, "similar to Burlington House," and Albert the Good looking out through the gate "highly ornamental in structure."

There is plenty of room in Kildare-street. Let two wings be built, uniform in style and position with the National Gallery and Museum, now standing in Merrion-square. The ground already belongs to the Society, and any additional ground can be acquired. The buildings can all be connected by covered galleries, which can be effectively used in the architectural treatment to bring the entire into a uniform pile. The Agricultural Museum, of which so much is made, is an iron building, with pillars, glass, and timber, which a contractor would remove and re-erect in a month. The massive gates in Kildare-street would be taken down, and the gravel courtyard filled with flowers and grass. There would be ample room to extend the buildings north and south,—a thing impracticable on the Leinster Lawn site. Dublin would be improved by noble buildings and cleared ground, the citizen would be proud to admire their old historic "Lawn," preserved from the despoiler, and the Government, in the desire to present a handsome gift to Dublin, will find all to praise, instead of the perfect tempest which the present proposal has raised. Every one condemns, papers of every shade of opinion unite in assailing, the attempt to destroy the finest square in Dublin.

RICHD. W. WALSH, M.Inst.C.E.I.

SITE OF THE OBELISK.

SIR,—When the model of the obelisk was placed in Parliament-square, there was some talk of repeating the experiment on points of the Embankment. There would be little practical difficulty in removing it to either the site you have suggested or to the Northumberland-avenue site, for temporary inspection. As regards the last-named site, there is one circumstance connected with it, besides the advantage of locality, which no other spot that has been proposed can possess,—that it will serve as a memorial of the late Duke of Northumberland, who was not only a liberal patron of Egyptian learning, but who was also himself among the earliest explorers and decipherers of the hieroglyphics. Some forty years ago he brought from Ethiopia,—when it was not easy to travel so far from the limits of civilisation,—a copy of the cartouch, or oval, containing the name of Queen Candace, which he had found among the ruins in the island of Meroe, perhaps the very Candace whose servant was baptised by Philip (Acts viii. 26); I say perhaps, because there may have been several queens of the name. Besides this, and various other services which he rendered to science, he made and placed in the museum at Alnwick Castle a collection of Egyptian tablets and other objects of antiquity, including a granite obelisk and a fragment of inscription from the Gebel Mokatteb, in the peninsula of Mount Sinai, which have only very recently been read and interpreted by Mr. Samuel Sharpe.

It may be well to mention that the word cartouch has been adopted to signify the oval in which the hieroglyphics of the names of royal personages are written.

JOSEPH BONOMI.

A SEMICIRCULAR CEILING TO A CONCERT-ROOM.

SIR,—Mr. Statham, in the article from his pen in your issue of Oct. 20, headed "Wanted, a Concert-room for London," referring to St. James's Hall as an auditorium, says:—"A circular ceiling or barrel-vault is not the shape for an auditorium; it focusses echo." Will you allow me to ask whether as a fact echo is experienced in St. James's Hall? I have been there often, and have never myself noticed it. Had it occurred, I should expect to find it in the front of the balcony, which, as Mr. Statham points out, is one of the very best places.

Experiment is of more value than theory. Theoretically, I candidly confess, I should have been inclined to agree with Mr. Statham in condemning the shape of the ceiling of St. James's Hall, but the result seems to show that our very able and sadly-undervalued colleague, Mr. Owen Jones, knew what he was about when he built that ceiling.

T. R. S.

LARGE BLOCK OF SHOP AND OFFICE BUILDINGS IN FINSBURY.

SIR,—I observe a description of the above buildings in your last issue, in which it is stated that the ground-floor consists of freestone and red granite columns, whereas it really is built entirely, on the Moorgate-street side and partly on other sides, of polished purple granite from Shap in columns and pilasters.

By publishing this correction, and by allowing me to add to the list of coloured granites enumerated by your correspondent "H. T.," purple from Shap, yellow grey from Shap, and bright red from Mull, you will much oblige me.

W. M.

*** We are also asked to mention that the width of the covered passages should have been stated as 15 ft., instead of 10 ft., as printed.

THE MASONS' REPLY.

SIR,—In your impression of October 20th there appears a letter which is signed "A Master Builder." This letter is in reference to the masons' strike. The object is, as far as I can understand, to clear away some misunderstanding in connexion with the strike. I, sir, should be glad if any one could make things sufficiently clear to settle the dispute in question. But as I was one of the delegates to meet the employers' representatives, I feel it to be my duty to contradict statements made by your correspondent, "A Master Builder"; likewise, to give an opinion on some of the matters he refers to, namely, the reduction in the hours of labour, and advance of wages. Now, sir, I beg to state that the chief point of discussion arose on the working hours, upon which, after a long debate, the chairman so far came to our views that he stated that any man or men starting half an hour later in the morning he did not in any way object to. Further, at any time should he have cause to discharge any of his men, they would not be the first to be discharged. Now, as the chairman acknowledged likewise that it did not in any way disarrange the business in the office, and being but a small body in the building trade, we fail to see the ground for opposition.

In reference to the hour question, I should further explain that another section of the building trade,—namely, the plumbers,—are working forty-seven hours per week, at the rate of 10d. per hour. There never appears to be any difficulty arising because they start later than other trades. I would say that I am at a loss to understand on what grounds they are entitled to 1d. per hour more than the masons. If it is extra skill, I think the mason requires as much as the plumber to be an efficient workman. In fact, we believe that in a public test it would be in our favour. "A Master Builder" says that directly we get the advance the carpenters are prepared to strike. Why did not they strike when the plumbers got their advance? Why have not they struck? We say why, because where there is any union existing, they always give a due notice for an advance, which they have not as yet sent in to the employers. In stating this I am not in a position to know that they have any intention of doing so. Further, I would say, the time we work does not meet with the views of the carpenters; why, I will try to explain. This is in the winter months, when we try to reduce our time; the carpenter, as a rule, has a nice warm shop to work in; he feels no effects of the cold, his shop being all closed in, and on that ground he prefers to work long hours during winter as well as in summer. Now the mason's shop is quite different; it is open in front, with a low roof, which causes it to be colder than being out of doors. If any one doubts this statement, let him go to the New Law Courts in the month of January. Now with regard to skill and wages paid. I beg to state that the question was asked, Would we allow any of our members to have more than the current rate? The answer was, Yes. But I should like to know of a case where it was offered, and to be shown when the union men objected to a member having it. The chief point was in reference to men being underpaid. We referred the employers to the New Law Courts, it being a strictly society shop. Previously to our present dispute there were numbers there of young men who were not getting the current rate of wages. The other workmen had sufficient knowledge to know that they were not worth it, and on that ground they were so far consistent to allow them to work for what they could get. Now, whilst writing on this matter, I should like to draw "A Master Builder's" attention to our rules, which state that a boy should be legally bound apprentice. If he would assist us, along with the other employers, in this important matter, by having all boys legally bound, we should not have many of the unskilled amongst us. With regard to the idle man, he, in my opinion, is worse than the drunkard,—not worth having at any price. If the society compels the employer to get rid of him, or pay him the current rate, they are doing the employer no harm, but are trying to make the drone reform, and not be a drag on society.

I likewise deny the assertion made, that a skilful man must eke out his time so as not to surpass the unskilful. How could such a system be carried out? Where would be the eyes of the foreman to allow such a scheme to be carried out? Can the master builders point out any rule in our Society's book that sanctions such a system as that?

The last matter referred to is that many masons are getting dissatisfied. So far, sir, I will allow that we are; but the reasons are these,—that the great majority of our men are getting the advance asked for, and a minority of some 500 or 600 have to depend on their Society for support, whilst there is plenty of work around them to do. In numbers of cases the employers are trying to sublet their work, and allow the sub-contractor to pay the advance, but will not acknowledge it themselves. Now, if they can get a profit and give a profit to another man, why or where is the reason they should not have both themselves? With regard to the funds, we are perfectly safe: we are now paying 3s. more than at the commencement of the dispute. I hope that "A Master Builder" has sufficient of foreign workmen, likewise a reform necessary to settle the dispute now existing between us.

C. B., One of the Deputation.

THE LONDON BUILDING TRADE.

A CROWDED meeting of the stonemasons on strike was held on the 18th inst., at Wilcocke's Assembly-rooms, Westminster Bridge-road. The chair was taken by Mr. H. Broadhurst, who said that the meeting held at Cannon-street Hotel had produced excellent results, and subscriptions were coming in from the other trades. During the last six weeks the committee had got on rapidly, and was fully supported by the central society. The position of the committee was now much better financially than it had been at the commencement of the strike. It had been stated that the employers in London were filling up the gaps in their employment with men from the ranks of those on strike and from the provinces. This, he could state, was entirely erroneous, and the men in the provinces would not in any way better themselves by coming to London to take the same wages as they were receiving at home. He blamed the secretary of the Employers' Association for preventing a meeting between the men and their employers, which would have, ere this, led to an understanding. It had been also stated in the papers that Mr. Webster would not pay the advance save to one special man; but he could tell them that every society man in Mr. Webster's employ had received the advance. Some fifty men from Italy and other countries had commenced work that day at the Law Courts, but he had little fear of their being long in the way. The employers had imported not only the men, but their families also. There were at present one or two American masons in London, who had not gone in to oppose the strike, and he had little fear of other Americans if they came over. It was stated that two additional firms had given the advance. It having been reported that some of the foreign masons had been mobbed and menaced by the English masons on strike, the officers of the London Strike Committee have written disclaiming all knowledge of or participation in this outrage. They "solemnly declare that no London mason has had anything to do with such proceedings," though how they are able to vouch so much does not appear. It is stated that huts have been erected within the works to accommodate the foreigners.

A meeting was held on Saturday evening at the Spread Eagle, Charles-street, Tottenham-court-road, comprised of delegates from the Amalgamated General Union and non-Society men of London belonging to the carpenters and joiners, for the purpose of obtaining from the employers a rise in wages and a diminution in the hours of work. The chair was occupied by Mr. Benton, who, in opening the proceedings, referred to the strike at present going on in the above trades at Manchester. Mr. Chandler moved,—"That in the opinion of this meeting, composed of delegates representing the carpenters and joiners of London, the time has arrived when we can ask for a reduction of the

hours of labour and an increase in our wages;" and in support of it he observed that they had not had an advance for four years. The resolution was carried by forty-five votes to ten.

MASTERS AND MEN.

Edinburgh.—The *Scotsman* publishes the following circular, which, it believes, has just been issued to the "Master Plasterers of Edinburgh, Leith, Portobello, and Vicinity," with a view to bring about a change in the working arrangements of the trade:—

"Edinburgh, October, 1877.

Gentlemen,—The United Operative Plasterers having had under consideration the manner in which the plaster work in a number of buildings in and around the city has been executed for some time back, resolved that it was their duty to do their utmost to prevent employers who may contract for work at an unremunerative rate, with the hope that they will get men to do the work in a manner at once detrimental to the best interests of masters, the public, and the trade, from underselling the employers who wish to execute their work in a fair and honest manner, at a fairly remunerative rate. I therefore state on behalf of the United Operative Plasterers, that on and after the above date they will decline to do three-coat plaster in any other manner than the following, viz.:—All angles properly straightened with a rule; walls and ceilings to be slack-floated and hand-floated with water; all the finishing coat to be hand-floated and polished. Hoping this will meet your approval, and that we will have your earnest and hearty support in carrying this measure faithfully to the letter, I have the honour to be, in name and on behalf of the United Operative Plasterers of Edinburgh, your obedient servant,

THOS. AITCHISON, Secretary."

Preston.—In February last the Preston plasterers resolved "that no employer of plasterers be allowed to sub-let any portion of their plaster-work." According to a Birmingham paper, a joiner and builder has been infringing this rule, and a few days ago he received a letter from the Operative Plasterers' Committee, containing the following order:—"We, the committee of this district, write to inform you that you are not allowed to let any portion of our branch, such as pudging or cementing walls or floors, as it belongs to our trade. It is against the rules of our society, as long as you employ our members, and you will oblige us by putting a stop to it at once."

TECHNICAL TEACHING AT THE ARTISANS' INSTITUTE.

THE following resolution was recently passed by the Technical Teachers' Committee of the Artisans' Institute in reference to the question of admitting amateurs and labourers to the classes.

Proposed by Mr. Caley, seconded by Mr. Mills, and carried unanimously:—

"That in reference to the question raised by Mr. Kenny in the *Daily News* of August 29th, as to admission of labourers to the Artisans' Institute, this committee are strongly of opinion that while unskilled workmen and the public generally will always be gladly welcomed to the other classes of the Institute, the technical classes are exclusively established for improving and perfecting artisans and apprentices in the technical branches of their various trades, the Institute having been designed for their benefit."

KENSINGTON VESTRY HALL COMPETITION.

GREAT dissatisfaction prevails amongst the competitors. The following note has been addressed to the chairman and members of the Board:—

"VESTRY-HALL COMPETITION.

Gentlemen,—We have read in the professional papers recently published, that *neither* of the four selected or premiated designs for the above can be carried out for the respective amounts of tenders submitted therewith. Under these circumstances we beg to submit that the authors of the *remaining designs* recommended for adoption by Mr. Whichcord, should now have the opportunity of sending in detailed estimates, or that there should be a fresh competition among the eight.

THE AUTHORS OF ONE OF THE EIGHT DESIGNS."

COMPETITIONS.

Joint Counties Lunatic Asylums, Carmarthen.—A selected number of architects having been invited to submit plans for the enlargement of the asylum and the erection of a hospital for infectious diseases, those of Messrs. John Giles & Gough have been selected by the Committee of Justices.

Wellingborough Grammar School. — Messrs. Bonner & Mills state that their designs were placed second in the above competition. Mr. Speechly's design not being in the number selected by the Governors as reported in our last.

Fever Hospital, Sheffield.—The following is the result of the competition for the proposed new Fever Hospital at Sheffield, for which twenty designs were sent in:—1st, Mr. Swan, architect, Sheffield; 2nd, Mr. Wm. Hill, Leeds; 3rd, Mr. D. Dodgson, Leeds.

Miscellanea.

The Edinburgh Aquarium.—The Town Council has decided to let a portion of the Vegetable Market for an aquarium; the promoter of that undertaking is Mr. R. M. Brechin. The space to be placed at his disposal, being a portion of the ground-floor at the west end of the market, may be described as a semicircular strip, with a length, following the curve, of about 200 ft., and a width of 17 ft. to 19 ft., together with the triangular space, in the south-west corner of the inclosure, not at present covered by the market roof. At the extreme south end, a tank somewhat larger than the rest, and capable of holding about 11,000 gallons, is intended to be appropriated to the conger-eels. Other six besides this will be set apart for marine creatures, while the remaining four, towards the north, are to be filled with fresh water. At the third tank from the south end, a passage 6 ft. wide will lead from the promenade to the triangular space, now outside the market, but which is to be roofed over, and treated in much the same manner as the promenade itself. Here a central area, 45 ft. long by 22 ft. wide, will be available for walking. Of the three arches under the roadway leading down to the market, two will be converted into ornamental caverns or rockeries, and the third occupied by the hot-air engine which will be required to carry on the work of the aquarium. With the fresh-water tanks there is little difficulty, all that is necessary being to keep up a constant supply from the city mains, which will flow from one tank to another, then by the cascade into the seal pond, to escape finally into the drains. To provide for the marine animals, however, a large reservoir will have to be formed under the floor of the triangular area, and filled in the outset with sea water. By means of a pump this will be sent into the tanks, and on leaving these, after having flowed through the series, it will be returned to the reservoir, to undergo a process of aëration, through which, with very slight addition to the stock, it can, we believe, be made to serve for an indefinite length of time. The work, we understand, is to be commenced at once, according to plans furnished by Mr. T. B. M'Fadzen, architect.

Cremorne Gardens and the Chelsea Embankment.—At the meeting of the Chelsea Vestry on the 17th inst., Mr. Lawrence moved,—

"That, having regard to the great change about to take place at the west end of the parish, by the conversion of Cremorne Gardens and the adjacent property into building land, a committee, to be called the Western Embankment Committee, be appointed, to consider and report as to the advisability of endeavouring to promote the continuation of the Chelsea Embankment from Battersea Bridge to the west end of Cheyne-walk."

The mover said that the Metropolitan Board of Works would have new grounds for considering the scheme, and if the improvement were carried out, they would no doubt have a fine class of property on the Cremorne Estate; and there would be a direct road from the Embankment right up to the western portion of South Kensington. By a diverging road through Cremorne, there would be a through communication into Addison-road, and, in fact, right into the Uxbridge-road. In addition to all these advantages, it would be a great sanitary improvement, for the embankment would do away with a most objectionable mud-bank, which at nearly all states of the tide was exposed, causing a very serious nuisance, especially in hot weather. Dr. Phene seconded the motion, which was carried unanimously, and a committee of thirteen members appointed.

The Adam Black Memorial, Edinburgh. Mr. Hutchison's statue of the late Mr. Adam Black, cast in bronze by Messrs. Cox & Son, Thames Ditton, has been safely delivered at the artist's studio in Edinburgh, and now only awaits the erection of the pedestal to take its place in East Princes-street-gardens. The casting is said to be a successful one, reproducing with fidelity all details of the modelling in head and hands. The design represents Mr. Black in his official robe as Lord Provost of the city. He is in standing posture. The statue stands 12 ft. high. It is intended to occupy a position midway between the Wilson statue and the Scott Monument, and will rest on a pedestal of fine Binnie freestone.

Cleopatra's Needle.—At the time we went to press last week it was feared that the obelisk and the vessel containing it were lost for ever. It appears that a severe gale sprang up on Sunday, the 14th inst., and in consequence the tow-rope of the *Cleopatra* was cast off at about six p.m. A heavy sea overwhelmed the *Cleopatra*, leaving her with a strong list to starboard, and breaking the rail ballast adrift. Fearing another such sea might capsize her, Captain Carter signalled for assistance. A boat, with six men, was sent from the *Olga*, and caught a rope thrown from the *Cleopatra*, but drifted away, being unable to hold on. The gale continuing, a successful attempt was made to get the *Cleopatra's* crew on board the *Olga*, and a search was made for the missing boat, but without avail. The *Olga* then tried to again find the *Cleopatra*, but could not sight her, and made sail for Falmouth. We are glad to state that the steamer *Fitzmaurice*, from Middlesbrough for Valencia, subsequently fell in with and recovered the abandoned treasure, about ninety miles north of Ferrol, though we regret that nothing has yet been heard of the missing boat and its occupants.

Memorial to the late Mr. John Kane.—After Mr. John Kane's death, many gentlemen in the iron trade, and others of his personal friends, desired to show their appreciation of his character by initiating a subscription on behalf of his widow, but as the North of England Arbitration Board and the ironworkers of the kingdom took the matter in charge, there was no opening for an expression of esteem towards the late ironworkers' secretary left except to raise some monument to his memory. This has been done in the Darlington West Cemetery, where his remains were interred. An obelisk of red granite, resting upon a base of grey granite, and about 10 ft. high, has been raised over the grave, with an inscription signifying that it is done in respectful remembrance of Mr. Kane, who, as the secretary of the National Ironworkers' Association, the Iron Trade Arbitration Board, and the Darlington School Board, in those and other capacities possessed the confidence and friendship not only of the industrial class to whose interest he was devoted, but of all sections of the community.

The Church of All Hallows the Great and Less, in Upper Thames-street, has been re-opened. The tower and vestibule on the north side of the church, which projected into the roadway, have been removed, and the site on which they stood has been thrown into the street. A new vestry, a tower for the bells, and the necessary offices, have been erected on the south side of the church. The cost of the alterations, with the necessary fittings for the interior, has been nearly 4,250*l.* The church is famous for its carved oak screen, supported on spiral columns, which, with the pulpit and reading-desk, was presented shortly after the Fire of London by the merchants of the Steelyard, which was in the parish of All Hallows the Great.

A Brighton Improvement.—On Saturday last the Lord Mayor of London visited Brighton and opened to the public the new roadway leading to the Railway Station. The new roadway has been formed by the widening of the upper part of Queen's-road from 40 ft. to 60 ft. To carry out this improvement the whole of the houses on one side of the street had to be demolished, and will be replaced by modern business premises. The change, which will not only remove an eyesore, but give most important facilities for traffic, is virtually the work of the railway company, as, although the Corporation paid by agreement 1,000*l.* towards it, that sum was only a small proportion of the cost.

The Canal Boats Act.—"A Watchman" writes with reference to "rumours that this Act of last session is likely to be inoperative, because no steps are being taken to carry out its provisions." He says, "This Act comes into operation next January, and it is quite time notices were given, and the Act and other information required were procurable at the principal places along the canals. So far from this being the case, nothing of the kind has been heard of. It would seem that the Act, Mr. George Smith's (of Coalville) work, and the erection of schools for the canal children, are, like the Bishop of Lichfield's boat, 'on the stocks.'"

Warrington.—Mr. R. Vawser has resigned his appointment as borough engineer in Warrington, which he has held for the last ten years, and intends to practise on his own account.

The Library of the Royal Institute of British Architects: New Regulations.—Forms of admission for those who are not members of the Institute, to read in the library, can now be obtained from the librarian; the Council having approved of the admission of the following gentlemen, viz., members of the Architectural Association, students of the Architectural Classes of the Royal Academy, King's College, and University College. The annual fee for such admission is 5s., and the library is open from ten a.m. to nine p.m. daily, and on Saturdays from ten till two.

Warehousemen and Clerks' Schools, Caterham.—On Saturday last the foundation-stone of a new wing of the Warehousemen and Clerks' Schools at Russell Hill, Caterham Junction, was laid by Mrs. Charles J. Leaf. The new wing is intended as a memorial of the late Mr. William Leaf, the first treasurer of the schools, and of his sons, Messrs. W. L. Leaf and F. H. Leaf. The new wing, the completion of which will enable the management to receive 100 additional children (making a total number in the schools 250), will be about 8,000*l.*

Destruction of the Colonsay Monument. The monument which was erected in 1876 to the late Lord Colonsay, in the island of Colonsay, on the west coast of Scotland, has been destroyed by lightning. The accident occurred on the same night that Inverary Castle was on fire. The monument, which is of red Mull granite, was built in the form of an obelisk, and stood 30 ft. high. It was built on the face of a projecting headland which was an outlook station in olden times, and was thus visible far and near.

Electric Light.—We have received a copy of the reports made to the Trinity House by Professor Tyndall and Mr. James N. Douglass, chief engineer of the Trinity House, after a series of comparative trials carried out for the purpose of ascertaining the relative merits of different constructions of electric light machines. According to the reports these trials established the value of electric light.

New Docks at Neath Abbey.—On Thursday, the 25th inst., Lady Dynevor cut the first sod of the new docks at Neath Abbey, which will be constructed to facilitate the shipping of steam coal for Aberdare and Merthyr, and thus save six miles of railway tonnage. The works are to be carried out by Messrs. Vignoles & Greenbank. The cost is put at 165,000*l.*

"Howard Medal."—The following is the title of the essay to which the medal will be awarded in November, 1878:—"The Effects of Health and Disease on Military and Naval Operations." Moreover, the Council of the Statistical Society have decided to grant the sum of 20*l.* to the writer who may gain the "Howard Medal" in November, 1878.

Liverpool Water Supply.—The Liverpool Town Council have matured a scheme for the supply of water to the town sufficient to provide for all requirements for many years to come. The supply is to be got from North Wales, at a cost of 1,250,000*l.* It is estimated that the saving of waste water in the borough will amount to 50,000*l.* per annum.

The Photographic Society.—The Society's Exhibition now open in the Gallery of the Water Colour Society, Pall-mall, will be found very interesting and agreeable. It includes 541 frames, besides 100 photographs taken during the late Arctic Expedition.

Another Exhibition for South Africa.—Upon the recommendation of a Select Committee of the Legislative Assembly, it has been decided to hold a second International Exhibition at Capetown, to be opened in April next.

Fall of a Viaduct.—The Brussels journals state that the viaduct now being constructed for the Dison to Hervé Railway, near Verviers, has fallen in. Two workmen were killed and seven injured.

A Good Example.—We observe that the workmen in the employ of Messrs. Colls & Sons, builders, Camberwell, have collected the sum of 13*l.* 6s. 4d. for the Indian Famine Relief Fund.

Bristol Cathedral.—The new nave, erected from the designs of Mr. Street, was inaugurated on Tuesday last. We shall illustrate it before long.

TENDERS.

For auxiliary buildings (for 402 patients), and two entrance-gates and lodges for same, at the Sedgfield Asylum, county of Durham. Mr. William Crozier, architect. Quantities supplied:—

	Main Buildings.	Entrance Lodges and Gates.
Inglis	£34,203 19 0	£1,130 10 0
Robinson	33,677 18 8	1,198 3 3
Ritter	33,574 13 0	1,280 19 0
Wilkinson & Pounder	32,440 0 0	1,196 0 0
Suggitt & Son	31,947 0 0	1,203 0 0
Elliott	31,8 0 0 0	1,230 0 0
Forster	31,445 7 2	1,230 6 1
Kyle	31,370 10 7	1,188 14 9
Crosby	31,245 0 0	1,259 0 0
Hutchinson & Bainbridge	30,934 17 3	1,178 10 4
Tomlinson & Son	30,598 0 0	1,196 0 0
Craggs & Benson	30,499 0 0	1,165 0 0
Gradon & Son	30,467 13 6	1,088 7 6
Robson & Son	30,194 0 0	1,179 0 0
Bailey	29,643 9 6	1,072 17 9
Marshall	28,779 0 0	1,217 13 0
Hodgson	28,435 0 0	1,055 0 0
Johnson (Middlesbro')	28,375 0 0	1,193 0 0
Johnson (W. Hartlepool)	27,550 0 0	1,160 0 0
Pearson Bros.	27,044 6 4	1,090 10 9
Stephenson	26,855 8 6	1,187 11 5½
Atkinson (accepted)	26,059 10 8	1,049 17 10
Fawell		1,044 4 0

[130 tenders were received in all, containing 411 distinct offers,—45 sole tenders, and 86 for different trades or sections. To the above amounts, of accepted tenders, may be added about 7,800*l.* for foundations and drains, already executed; irrigation, cooking, heating, and ventilating apparatus, and gas and water mains, &c., say under 34,000*l.* for buildings complete in every respect.]

For cast and wrought iron tanks, of a total capacity of about 40,000 gallons, for the School for Imbecile Children, Darenth, Kent, for the Metropolitan Asylum Board. Messrs. A. & C. Harston, architects:—

Beck & Co.	£1,550 0 0!
J. & E. Hall	1,269 0 0
Powis & Co.	1,264 0 0
The Horsley Co. (Limited)	1,076 0 0
Spencer & Gillett	1,035 0 0
Fraser Bros.	1,029 0 0
Morewood & Co.	1,025 0 0
Wright & Co.	1,018 13 0
Masefield	1,000 0 0
Le Feure & Co.	999 0 0
J. & F. May	995 0 0
Spendlagh & Co.	984 0 0
Cochrane & Co.	964 0 0
Batneree & Co.	960 0 0
Abell	955 0 0
Newton, Chambers, & Co.	951 0 0
Hill & Smith	940 0 0
J. O. & O. E. Brettell	936 0 0
Chandler & Sons	909 0 0
Jukes, Couison, & Co.	809 0 0
Ashmore & White	796 0 0
Pontifex & Wood (accepted)	698 0 0!

For the erection of twelve houses and a shop, Leyton-road, Stratford, for Mr. J. Dowsett. Mr. J. W. Brooker, architect:—

Cullum	£3,675 0 0
Sheffield & Prebble	3,483 0 0
Cardoza	3,404 0 0
Reed	3,325 0 0
Charlton & Mansell	3,160 0 0
Smith (accepted)	2,850 0 0

For re-building the Yorkshire Grey Tavern and Restaurant, Gray's-inn-road, for Messrs. Legge & Chapman. Messrs. J. W. Brooker, and Isaacs & Florence, architects:—

Lawrance	£5,650 0 0
W. & F. Croaker	5,390 0 0
Wagner	5,183 0 0
Downs	5,045 0 0
Tink	4,983 0 0
Morter	4,878 0 0
Axford (accepted)	4,795 0 0

For the erection of school in rear of Baptist Chapel at Tunbridge Wells. Mr. J. W. Brooker, architect:—

Austin	£590 10 0
Eason	557 0 0
Battley	548 0 0
Wickham	485 0 0

For the erection of shop premises in High-street, Shoreditch, at the corner of Great Eastern-street, for Mr. A. Ewin. Mr. J. W. Brooker, architect:—

	Sub-structure.	Super-structure.
Crabb	£430	£1,985
Morter	375	1,970
Oliver	366	1,660
Lawrance	360	1,640
Axford	318	1,625
Downs	333	1,536
Cullum	373	1,535
Wagner	295	1,465

For the finishings to twelve houses (in carcass) in Brailsford and Arlingford roads, Brixton, for Mr. R. G. Chapman. Mr. J. W. Brooker, architect:—

W. & F. Croaker	£2,575 0 0
Battley	2,487 0 0
Cullum	2,395 0 0

For building new Auxiliary County Lunatic Asylum, at Thorpe, near Norwich. Mr. R. M. Phipson, architect. Quantities by Messrs. Whitmore & Keanard:—

Martin, Wells, & Co.	£45,450 0 0
Lacy	37,989 0 0
Youngs	37,900 0 0
Downing	37,686 0 0
Hawes	37,409 0 0
J. W. Martin	35,897 0 0
Everett & Son	35,750 0 0
Cornish & Gaymer (accepted)	33,920 0 0

For new factory in the Euston-road, for Messrs. F. Braby & Co. Mr. E. L. Tarbuck, architect:—

Manley & Rogers	£3,177 0 0
Longmire & Burge (accepted)	2,970 0 0

For erecting twelve warehouses, Farringdon-road. Mr. E. N. Clifton, architect. Quantities by Messrs. Williams & Gritten:—

Webster	£76,711 0 0
Holland	68,840 0 0
Ashby & Horner	67,100 0 0
Conder	66,494 0 0
Lawrence	64,829 0 0
Brass	61,183 0 0
Ashby Bros.	60,250 0 0
Peto Bros.	58,773 0 0

For works at Hackney, for Mr. S. Betts. Mr. Chas. R. Peters, architect:—

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Stamp & Bowtle	803 0 0
Banner	787 0 0
Judd & Hawkings	785 0 0
Weston	730 0 0
Thomerson	696 0 0
Beale	679 0 0
Palmer	600 0 0
Walker	576 16 0

For warehouse and premises, No. 46, Basinghall-street. Mr. H. H. Collins, architect. Quantities prepared by Messrs. Batstone Bros.:—

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Newman & Mann	5,417 0 0
Ashby Bros.	5,343 0 0
Browne & Robinson	5,320 0 0
Waldram & Co.	5,310 0 0
Scrivener & White	5,293 0 0
Merritt & Ashby	5,220 0 0
Mark	4,975 0 0
Abraham	4,790 0 0
Nightingale	4,713 0 0
Kirk & Randall	4,688 0 0

For a parish-room, in the churchyard of St. Michael Queenhithe, City of London. Messrs. Mathews, architects:—

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Newman & Mann	1,025 0 0
Conder	950 0 0
Dove	925 0 0
Ramsey	914 0 0
Browne & Robinson	837 0 0

For grand stands and offices at Kempton Park, near Sunbury, Middlesex, for the Kempton Park Race-course Company. Messrs. Clark & Holland, architects. Mr. S. J. Thacker, surveyor:—

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Higgs & Hill	18,500 0 0
Cubitt & Co.	18,235 0 0
Shaw	17,899 0 0
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Braid & Co.	16,977 0 0

For erecting a building and offices on the site of the old Princes' Stand, Epsom Downs, Surrey, for Lieut. C. V. Strange. Mr. J. R. Harding, architect. Quantities by Mr. T. Nixon:—

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Taylor	2,100 0 0
Hooker	2,078 0 0
Colls & Son	1,975 0 0
Shearburn	1,920 0 0

For two gas-holders, for the Tunbridge Wells Gas Co. each 112 ft. diameter, by 30 ft. 6 in. deep, single lift, with wrought-iron guide framing, cast-iron dry wells, inlet and outlet pipes, with bye-passes between each pair of pipes. Mr. R. F. Spice, architect:—

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Cockey & Son	10,320 0 0
Cutler & Sons (accepted)	10,190 0 0

For planting grounds of school, at Banstead, Surrey, for Kensington and Chelsea School District. Messrs. A. & C. Harston, architects:—

Veitch & Son (accepted)	£412 13 0

For shops and offices, Nos. 115, 116, and 117, Newgate-street. Messrs. Ford & Hesketh, architects:—

Morter	£6,990 0 0
Perry & Co.	6,984 0 0
Brass	6,820 0 0
Kirk & Randall	6,708 0 0
Browne & Robinson	6,618 0 0
McLachlan & Sons	6,590 0 0
Ashby Bros.	6,581 0 0
Crabb	6,446 0 0
Scrivener & White	6,421 0 0
Lawrance	6,367 0 0
Nightingale	6,300 0 0
Newman & Mann (accepted)	6,167 0 0

For new schools at Chepstow, for School Board. Mr. W. Evill, architect:—

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Thorn	1,287 16 0

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Farrant	1,367 0 0
Gregar (accepted for three pairs)	1,305 0 0
Hoskings (error)	1,070 0 0

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